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THE
CYCLOPÆDIA;
OR,
Universal Dictionary
OF
ARTS, SCIENCES, AND LITERATURE.

VOL. XXX.

THE HISTORY OF THE

ROYAL SOCIETY OF LONDON

FROM ITS INSTITUTION TO THE PRESENT TIME

THE
CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

WITH THE ASSISTANCE OF

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BY THE MOST DISTINGUISHED ARTISTS.

IN THIRTY-NINE VOLUMES.

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CYCLOPÆDIA:

OR, A NEW

UNIVERSAL DICTIONARY

OF

ARTS and SCIENCES.

REPUBLIC.

REPUBLIC, *RESPUBLICA*, *commonwealth*, a popular state or government; or a nation where the body, or only a part of the people, have the government in their own hands.

When the body of the people is possessed of the supreme power, this is called a *democracy*. When the supreme power is lodged in the hands of a part of the people, it is then an *aristocracy*. See *ARISTOCRACY* and *DEMOCRACY*.

The celebrated republics of antiquity are those of Athens, Sparta, Rome, and Carthage. At present, there is scarcely any such thing as a real republic, *i. e.* a strictly popular state. Indeed, the Venetians and Genoese have called their states republics; but their government was apparently *oligarchic*.

The Dutch, in their former state, came the nearest to the character of a republic; yet they were very defective, at least in the sense and severity with which Rome, Carthage, &c. were republics. See *STATES-General*.

It is a remark of M. St. Evremont, that if the Dutch love the republican form, it is more for the sake of their trade than of their liberty.

Holland, which was composed of about fifty republics, all different from one another, might be considered as a confederate republic; or a convention by which several petty states agree to become members of a larger one, which they intend to establish. When several sovereign and independent states unite themselves together by a perpetual confederacy, whilst each of them continues to be a perfect state, they will form together a federal republic: the deliberations in common will offer no violence to the sovereignty of each member, though they may, in certain respects, put some constraint on the exercise of it, in virtue of voluntary engagements. A person does not cease to be free and independent when he is obliged to fulfil the engagements into which he has

very willingly entered. In this view, Germany, which consisted of free cities, and of petty states, subject to different princes, and the Swiss cantons, were considered in Europe as perpetual republics.

Of this kind were formerly the cities of Greece; and in later times were the seven United Provinces of the Netherlands; and such, as we have just said, were the members of the Helvetic body. To this class we may likewise refer the federal government of the United States of America. See *GOVERNMENT*.

Baron de Montesquieu, in his "Spirit of Laws," enumerates the following distinctive properties of a republic. It should have a small territory; otherwise it cannot long subsist. In a large republic there are men of large fortunes, and consequently of less moderation; there are too great deposits to intrust into the hands of a single subject; interests are divided; an ambitious person soon becomes sensible that he may be happy, great, and glorious, by oppressing his fellow-citizens; and that he might raise himself to grandeur on the ruins of his country.

In a large republic, the public good is sacrificed to a thousand views; it is subordinate to exceptions; and depends on accidents. In a small one, the interest of the public is easier perceived, better understood, and more within the reach of every citizen; abuses have a lesser extent, and of course are less protected.

The long duration of the republic of Sparta was owing to its having always continued with the same extent of territory after all its wars. The sole aim of Sparta was liberty; and the sole advantage of its liberty, glory.

It was the spirit of the Greek republics to be as contented with their territories, as with their laws. Athens was first fired with ambition, and gave it to Lacedæmon; but it was an ambition rather of commanding a free people, than of

governing slaves; rather of directing than of breaking the union. All was lost upon the starting up of monarchy, a government whose spirit is more turned to increase and advancement.

Excepting particular circumstances, as when a petty sovereign supports himself betwixt two great powers by means of their mutual jealousy, it is difficult for any other than a republican government to subsist long in a single town. A prince of so petty a state would naturally endeavour to oppress, because his power would be great, while the means of enjoying it, or of causing it to be respected, would be very inconsiderable. The consequence of this would be, that he would trample upon his people. On the other hand, such a prince might be easily crushed by a foreign, or even a domestic force; the people might every instant unite and rise up against him. Now, as soon as a prince of a single town is expelled, the quarrel is over; but if he has many towns, it only begins.

REPUBLIC of *Letters*, is a phrase used in speaking collectively of the whole body of the people of study and learning.

There is a journal, begun in Holland, by M. Bayle, and continued by M. Bernard, consisting of extracts of books, printed in the course of the year, called "Nouvelles de la Republique des Lettres," News from the Republic of Letters. See JOURNAL.

REPUBLICAN of a *Will*. See WILL.

REPUDIATION, REPUDIUM, in the *Civil Law*, the act of divorcing. See DIVORCE.

REPULSE BAY, in *Geography*, a bay on the N.E. coast of New Holland, in the South Pacific ocean. S. lat. $20^{\circ} 36'$. W. long. $148^{\circ} 33'$. — Also, a bay on the coast of Kerguelen's land. — Also, a bay on the W. coast of America. N. lat. $66^{\circ} 40'$. W. long. 85° .

REPULSION, REPULSION, in *Physics*, the act of a repelling power, by which bodies, under certain circumstances, naturally fly from each other.

Repulsion is the counter part to *attraction*. Attraction only reaches to a little distance; where that terminates, there repulsion commences. See AIR and COMPRESSION.

Indeed, we meet with many obvious instances of repulsion among bodies, as between water and oil, and, in general, between water and all unctuous bodies; between mercury and iron, as also between the particles of dust, &c.

Thus, if a fat body, lighter than water, be laid on the surface of it, or if a piece of iron be laid on mercury, the surface of the fluid will be depressed about the bodies laid on it. This is a plain indication of repulsion; as the rising up of the fluid about the surfaces of other incumbent bodies is of attraction.

In the latter case, the fluid is suspended, by an attractive power, above the level, and kept from falling by its gravity: in the former, a depression is made by the repelling power, which the liquor, notwithstanding its gravity, cannot run down into, and fill up.

Upon this depend all the phenomena of very light glass bubbles floating on water, about which, when clean, the water rises; but when greased, the water sinks into a channel all around them. Hence also it is, that in a glass-vessel of water, the fluid stands higher all about the edges near the glass than towards the middle; but when the glass is filled till the water run down on all sides, then it stands higher at the middle than at the sides. Hence, also, in a glass not full of water, a clean glass bubble always runs to the side, by reason the pressure, which is upon it towards the middle, is partly taken off by the attractive force with which the water is raised near the edge.

If the glass be so full as to be ready to run over, the bubble returns from the side towards the middle, the force with which the water is raised in the middle taking off part of the pressure.

Just the reverse happens if the bubble be greasy; because there the force, by which the water and the bubble repel each other, is greatest where the water is highest. Two clean bubbles and two greasy ones always run towards each other, as being attracted; and a greasy and a clean one always fly each other, as being repelled.

REPUTATION, *Injuries affecting*. See INJURY.

REQUENA, in *Geography*, a town of Spain, in New Castile, seated on the top of a hill, near the Ollana, on the borders of Valencia. Bourgoanne, a modern traveller, says, that wealth and activity proclaim in this place the presence of industry, and accordingly the number of silk looms amounts to 900. It has been supposed to be the Salaria, placed by Ptolemy in the country of the Bastitani; 55 miles S.E. of Cuenca.

REQUEST, in *Law*, a supplication or petition preferred to a prince, or court of justice, begging relief in some conscientious cases, where the common law grants no immediate redress.

The term request is now, since the institution of chancery, much diffused; together with the court of requests, where requests were cognizable.

In the old government of France, *requêtes civiles*, civil requests, obtained for the annulling of contracts, &c. made by surprize.

They had eighty masters of requests to take cognizance of causes between the officers of the crown, the servants of the household, &c.

REQUESTS, *Court of*. See COURT of *Requests*, and COURT of *Conscience*.

REQUEST, in *Hunting*, is when the dogs have lost the quest or tract of the beast, and must *request*, or *quest* it again. They say, *to call to the request, come to the request*, &c.

To request the game is chiefly used, when, after having run it down the night before, they seek it again the next morning with the blood-hound, or the like.

REQUEURIA, in *Botany*, a genus named in the *Flora Peruviana*, page 16, after Louis Requeur, a Spaniard, who was apothecary to king Philip V. *De Theis*. We are unacquainted with the plant, as well as with the botanical merits of the person to whom it is dedicated.

REQUIEM, a mass sung in the Romish church for the rest of the soul of a person deceased.

It is thus called, because the introit begins with "Requiem æternam dona eis, Domine," &c.

REQUINY, in *Geography*, a town of France, in the department of the Morbihan; 6 miles N.W. of Joffelin.

REQUISTA, a town of France, in the department of the Aveyron; 18 miles S. of Rhodéz.

RERE COUNTY. See RIER County.

RERE *Fiefs*, a name given in the Scotch laws to those fiefs which were held by inferior tenants or feudatories, that cultivated the lands under the chief feudatories, who held by military service.

RERE *Ward, arriere-garde*. See REAR, and GUARD.

REREDOS, the screen at the back of an ancient high altar, which separated it from the Lady-chapel, being, for the most part, highly ornamented with niches, canopies, and tracery work. The richest of these which have reached our time are those of Winchester and Durham cathedrals, and of St. Alban's abbey.

RERHUTTAN, in *Geography*, a town of Sweden, in Dalecarlia; 30 miles S.W. of Gessle.

RERIGONIAN BAY, in *Ancient Geography*, a bay on the northern side of ancient Britain, now Loch-rain, formed by the Mull of Galloway.

RERIGONIUM, called by some *Berigonium*, a town of the Novantæ, situated somewhere in Galloway, according to Camden the present Bargeny in Carriët; but Horsley prefers Barton or Strathaven.

RERONE, in *Geography*, a river of Italy, which rises in the Vicentin, and runs into the Brenta.

RERRE, a river of France, which runs into the Saudre, about a league above Romorantin.

RES, *Thing*. See REALITY, ENS, ESSE, SUBSTANCE, &c.

RES Mancipi. See ABALIENATION.

RES Naturales. See NATURALS.

RES Non Naturales, &c. See NON-naturals, &c.

RESAFA, in *Ancient Geography*, a town of Asia, on the W. side of the Euphrates.

RESAIA, a town of Mesopotamia, in Ofrhoené.

RESAINA, or THEODOSIOPOLIS, *Ras-vin*, or *Ain-verdab*, a town of Mesopotamia, upon the banks of the river Chabotas. This town was famous on account of the victory obtained over Sapor by the younger Gordian, in the year 243. Under the empire of Severus, it was elevated to the dignity of a colony; and under Theodosius it assumed the name of Theodosiopolis.

RESAPHE, a town of Palmyrene, according to Ptolemy; but Procopius called it Sergiopolis. It was at some distance from the Euphrates.

RESAU or **REHAU**, in *Geography*, a town of Germany, in the principality of Culmbach; 7 miles E.S.E. of Hoff.

RESAVA, a river of Servia, which runs into the Passarowitz.

RESCEIT, **RECEPTIO**, in *Law*, an admission or receiving of a third person to plead his right, in a cause formerly commenced between other two.

As, when an action is brought against a tenant for life or years, and he makes default; in such case he in the reversion may come in and pray to be received, to defend the land, and to plead with the demandant.

RESCEIT is also sometimes applied to an admittance of plea, though the controversy be only between two. He in reversion may come into court, and pray to be received in a suit against his particular tenant.

RESCEIT of *homage*, *receptio homagii*, denotes the lord's receiving homage of his tenant, at his admission to the lands.

RESCHOUET, in *Geography*, a town of Prussia, in Pomerelia; 7 miles N.N.E. of Zarnowitz.

RESCIPHA, in *Ancient Geography*, a place of Mesopotamia, on the banks of the Euphrates; situated S. of Corfote, and near to it.

RESCISSION, **RECISSIO**, formed of *re*, and *scindo*, q. d. *I cut or divide again*, in the *Civil Law*, an action intended for the annulling or setting aside of any deed, contract, or the like.

A thing's being found damaged, or sold at above double the just value, is a good cause of rescission.

The deed or contract thus annulled, or rescinded, is sometimes called a *rescissory*; though that denomination be more properly given to the action brought for rescinding or setting it aside; which is properly called *actio rescissoria*.

RESCOUS, or **RESCUE**, *Rescussus*, in *Law*, an illegal taking away, and setting at liberty, a distress taken, or a person arrested, by process, or course of law. This is properly a *rescous* in *fact*. If one distress beasts for damage feasant in his ground, and as he drives them along the highway towards the pound, they enter into the owner's house, and he withholds them there, and will not deliver them upon demand; this detainer is a *rescous*

in *law*. For a rescous, or the taking of goods by force, when, in a distress, they are in the custody of the law, which is considered as an atrocious injury, the distresser has a remedy in damages, either by writ of *rescous* (F. N. B. 101.), in case they were going to the pound, or by writ of *de parco fracto*, or pound-breach (ibid. 100.) in case they were actually impounded. He may also at his option bring an action on the case for this injury, and shall therein, if the distress were taken for rent, recover treble damages. (Stat. 2 W. & M. sess. 1. c. 5.) In case of the forcible delivery of a person arrested from the officer who is taking him to prison, the plaintiff has a similar remedy by action on the case, or of rescous (6 Mod. 201.); or, if the sheriff makes a return to such rescous to the court out of which the process issued, the rescuer will be punished by attachment. Cro. Jac. 419. Salk. 586. See **RESCUE**.

He that commits a rescue or rescous, is called the *rescussor*.

RESCOUS is also used for a writ which lies for this fact, called *breve de rescussu*.

RESCRIPT, **RESCRIPTUM**, an answer delivered by an emperor, or a pope, when consulted by particular persons, on some difficult question or point of law, to serve as a decision of it.

The civil and canon laws are full of such rescripts.

When the rescript was made in answer to the enquiry of a community, it was called a *pragmatic sanction*.

The papal rescripts are a kind of bulls or monitories, beginning with these words, "Significabit nobis dilectus filius," &c. They never obtained either in England or France, when contrary to the liberties of the English and Gallican churches; but were declared abusive.

Among the Romans the contending parties and even the magistrates themselves, frequently consulted the emperor on the measures they were to take in certain and nice difficult cases; and the answers returned by the emperor on such consultations, were called *rescripts*. These had not, indeed, the full force of laws; but they were deemed a strong prejudice or presumption: and in succeeding ages, they had the force of perpetual laws, though they ought to be carefully distinguished, by every rational civilian, from those general constitutions which had only the nature of things for their guides.

Justinian has inserted a great number of them in the Code; and by that means given them the authority they before wanted.

The author of the life of the emperor Macrinus observes of that prince, that he would have his officers judge by laws, not by rescripts; as esteeming it absurd to admit the wills of ignorant men, such as Commodus and Caracalla, for rules of judging; and because Trajan never gave any rescripts at all, as being loth to countenance a custom, where what is frequently granted as a favour, in particular cases, might be afterwards pleaded as a precedent. It is added, that Macrinus had a design to strip the rescripts of all their authority.

M. Schulting, in his *Dissertations*, does not at all approve of this design; and to the emperor's reasons answers, that indeed all rescripts are not to be admitted; that those which appear dictated out of favour, are to be thrown aside; but those which appear founded in reason, and natural equity, are, with Justinian, to be allowed. He adds, that it cannot be denied but the worst emperors have frequently made good laws, and useful rescripts.

As to what is urged of the emperor Trajan's never giving any rescripts, it appears but ill supported. For what is it but a rescript that he delivers to Pliny on the subject of the Christians, lib. x. epist. 28? Or that on the Isclastici, lib. x. epist. 120? The Digest, and Pliny's Epistles, need

only to be opened and compared, to find rescripts of Trajan. The rescripts of the emperor, his grants and decrees, his edicts and pragmatic sanctions, were subscribed in purple ink, or a compound of vermilion and cinnabar; and transmitted to the provinces as general or special laws, which the magistrates were bound to execute, and the people to obey. But as their number continually multiplied, the rule of obedience became each day more doubtful and obscure, till the will of the sovereign was fixed and ascertained in the Gregorian, Hermogenian, and the Theodosian codes.

RESCUE. See **RESCOUS.** See also **DISTRESS**, and **DISSEISIN.**

RESCUE is one of those offences against public justice, which consists in the forcibly and knowingly freeing another from an arrest or imprisonment; and it is generally the same offence in the stranger for rescuing, as it would have been in a gaoler to have voluntarily permitted an escape. A rescue, therefore, of one apprehended for felony, is felony; for treason, treason; and for a misdemeanour, a misdemeanour also. But here likewise, as upon voluntary escapes, the principal must first be attainted, or receive judgment before the rescuer can be punished: and for the same reason; because perhaps in fact it may turn out that there has been no offence committed. By statute 11 Geo. II. c. 26. and 24 Geo. II. c. 40. if five or more persons assailable to rescue any retailers of spirituous liquors, or to assault the informers against them, it is felony, and subject to transportation for seven years. By the statute 16 Geo. II. c. 31, to convey to any prisoner in custody for treason or felony any arms, instruments of escape, or disguise, without the knowledge of the gaoler, though no escape be attempted, or any way to assist such prisoner to attempt an escape, though no escape be actually made, is felony, and subjects the offender to transportation for seven years: or if the prisoner be in custody for petit larceny, or other inferior offence, or charged with a debt of 100*l.*, it is then a misdemeanour, punishable with fine and imprisonment. And by several special statutes, to rescue, or attempt to rescue, any person committed for the offences enumerated in those acts, is felony without benefit of clergy; and to rescue, or attempt to rescue, the body of a felon executed for murder, is single felony, and subject to transportation for seven years. Nay, even if any person be charged with any of the offences against the black act, 9 Geo. I. c. 22, and, being required by order of the privy council to surrender himself, neglects so to do for forty days, both he and all that knowingly conceal, aid, abet, or succour him, are felons without benefit of clergy. See **CONTEMPT.**

RESCUSSOR, in *Law*. See **RESCOUS.**

RESA, or **REZE**, in *Geography*, a town of France, which runs into the Saudre, at Romorantin.

RESEARCH, formed of the French, *recherche*, and literally denoting a *second search*, a diligent search or enquiry into any thing.

RESEARCH, in *Music*, is a kind of prelude or voluntary played on the organ, harpsichord, violin, &c. in which the composer seems to *search* or look out for the strains and touches of harmony, which he is to use in the regular piece to be played afterwards.

This is usually done off-hand; and consequently it requires a master's skill. When in a motetto, the composer takes the liberty to use any thing that comes into his head, without applying any words to it, or subjecting himself to the sense or passion of it, the Italians call it *fantasia ricercata*, the French *recherche*, and the English *research* and *voluntary*.

RESEARCHING, in *Sculpture*, the repairing of a cast, figure, &c. with proper tools; or the finishing it with art and exactness, so as that the minutest parts may be well defined.

RESEDA, in *Botany*, a name which occurs in Pliny, and is evidently derived from *resedo*, to allay or mitigate; so that the second syllable, vulgarly pronounced short; ought to be long. Pliny reports that this herb is known in the neighbourhood of Rimini, and is used for dispersing tumours, and all kinds of inflammations. The person who applies the medicine, says "Reseda allay these diseases," repeating these words, with some others, and spitting as often. After this account, the reader may not be anxious to know what Pliny's *Reseda* was. We have certainly no more reason to believe it the same as our's, than we have to rely on his sapient prescription.—Linn. Gen. 242. Schreb. 326. Willd. Sp. Pl. v. 2. 876. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 512. Prodr. Fl. Græc. Sibth. v. 1. 322. Ait. Hort. Kew. v. 3. 153. Juss. 245. Tourn. t. 238. Lamarck Illustr. t. 410. Gært. t. 76. (*Luteola*; Tourn. t. 238. Sefamoides; Tourn. t. 238.)—Class and order, *Dodecandria Trigynia*. Nat. Ord. *Miscellanea*, Linn. *Caparides*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, deeply divided into narrow, erect, permanent segments, two of which are further asunder than the rest, for the accommodation of the honey-bearing petal. *Cor.* Petals several, unequal; some of them always cut half way down into three segments; the upper one gibbous at the base, bearing honey, the length of the calyx. Nectary a flat erect gland, proceeding from the receptacle, situated at the upper side of the flower, between the stamens and uppermost petal, converging with the dilated base of the petals. *Stam.* Filaments eleven or fifteen, short; anthers erect, obtuse, the length of the corolla. *Pist.* Germen gibbous, ending in three or four very short styles; stigmas simple. *Peric.* Capsule gibbous, angular, coriaceous, tipped with the styles, and gaping at the summit between them, of one cell. *Seeds* numerous, kidney-shaped, inserted into the angles of the capsule.

Obf. Linnæus observes, that there is scarcely any genus whose character is more difficult to determine, both the number and shape of the parts being different in different species. The essential character consists in the three-cleft petals, one petal bearing honey at its base, and the capsule not being closed, but always gaping.

R. Luteola has the *perianth* in four deep segments; *petals* three, the upper, or honey-bearing one, cut half way down into six segments; the lateral ones opposite, three-cleft; to which are often subjoined, by nature or luxuriance, two more, very small, undivided petals; the *styles* are three: *stamens* numerous.

R. alba has six deep segments in the *perianth*: *petals* six, nearly equal, all of them half three-cleft; *styles* four; *capsule* with four angles; *stamens* constantly eleven.

Some other species have a deeply five-cleft *perianth*; five dissimilar three-cleft *petals*; *styles* three; *stamens* numerous.

Ess. Ch. Calyx of one leaf, deeply divided. Petals lacinated. Capsule superior, gaping at the top, of one cell, with many seeds.

1. *R. Luteola*. Dyer's-weed, Yellow-weed, or Weld. Linn. Sp. Pl. 643. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 320. Mart. Ruit. t. 40. (*Luteola*; Ger. Em. 494. Pseudostruthium; Matth. Valgr. v. 2. 643.)—Leaves lanceolate, undivided, flat. Calyx four-cleft.—Native of waste ground, rubbish, banks, and old walls, chiefly about villages, in most of the temperate parts of Europe. About Norwich it is very common; partly perhaps from the dispersion of its seeds, in consequence of the great use made of the cultivated herb, in the woollen manufactory of that city, for dyeing yellow. The colour it affords is very bright, and is especially useful for making
a good

RESEDA.

a good green; the cloth being first dyed blue. The *herb* is annual, flowering in July. *Root* spindle-shaped. *Stem* erect, wand-like, two or three feet high, branched, leafy, striated, smooth. *Leaves* linear-lanceolate, entire, smooth, for the most part furnished with a small callous tooth, on each side, at the base. *Flowers* small, cream-coloured, very numerous, in long, simple, solitary, terminal, slightly drooping *spikes*, which, according to Linnæus, follow the course of the sun, even in a cloudy day—

“ True, as the dial, to the sun,
Although it be not shined upon.”

2. *R. canescens*. Hoary Base Rocket. Linn. Syst. Nat. ed. 12. v. 2. 330. Willd. n. 2. Ait. n. 2? Vahl. Symb. v. 2. 52. (R. hexagyna; Forsk. Ægypt-Arab. 92. Sefamoides falmanticum parvum alterum; Cluf. Hist. v. 1. 296, no figure. S. flore albo, foliis canescentibus; Tourn. Inst. 424.)—Leaves lanceolate, wavy, somewhat hairy. Branches hispid.—Native of waste ground near Cairo. *Forskall*. Probably also of the south of Europe. The *stems* are decumbent, branched, eighteen inches or more in length, round, leafy, rough with copious, minute, white, spreading, short, brittle hairs. *Leaves* scattered, lanceolate, one and a half or two inches long, bluntish, entire, wavy, and roughish at the edges, as well as at the midrib on both sides; otherwise smooth, and somewhat glaucous; tapering at the base, and sending down two elevated ribs, for some distance, along the branch. *Flowers* in long, terminal, stalked, hairy clusters, on short partial stalks. *Calyx* five-cleft. *Petals* white. *Germen*, according to *Forskall*'s description, stalked, with six *styles*.—Vahl has well remarked that *R. canescens* of Sp. Pl. cannot be the same with the above. Indeed it appears to be no other than either *R. sefamoides* or *purpurascens*, the figure of Clusius agreeing best with the former; his description and the Linnæan definition with the latter. Yet this same figure, adopted by Gerarde, seems to be the only foundation on which *R. canescens* depends for a place in Hort. Kew.—We have never seen the true *canescens* living, nor can we find a figure of it.

3. *R. glauca*. Glaucous Base Rocket. Linn. Sp. Pl. 644. Willd. n. 3. Ait. n. 3. (R. linearæ foliis; Bauh. Prodr. 42, no figure. Sefamoides linearæ folio glauco, pyrenaica, flore staminico; Morif. sect. 15. t. 1. f. 4.—Leaves linear; toothed at the base. *Styles* four.—Native of the Pyrenæan mountains; according to Burser's herbarium, examined by Linnæus. Gathered also by Læfing, in Spain. The *root* is said to be perennial, but has the appearance of being annual. Whole herb glaucous, slender, and smooth. *Stem* twelve or eighteen inches high, simple, round, wand-like, leafy. *Leaves* about two inches long, very narrow; all nearly of equal breadth, furnished at the base with a few white brittle teeth. *Cluster* terminal, solitary, very long, of numerous white *flowers*, whose *petals* are less divided than in most other species.

4. *R. dipetala*. Flax-leaved Base Rocket. Ait. n. 4. Willd. n. 4. Vahl. Symb. v. 2. 52. (R. capensis; Burm. Prodr. 13.)—Leaves linear, entire. *Styles* four. *Petals* two, undivided.—Native of the Cape of Good Hope, from whence its seeds were sent to Kew, in 1774, by Mr. Maffon. The plant is biennial, flowering in August, being preserved in a greenhouse through the winter. Vahl compares its general aspect to *R. sefamoides*, hereafter described. *Stem* somewhat shrubby, erect, with round branches. *Leaves* about an inch long, rather fleshy, smooth. *Cluster* terminal, lax. Segments of the *calyx* six, minute, bordered with white. *Petals* only two, wedge-shaped, undivided.

5. *R. purpurascens*. Purplish Base Rocket. Linn. Sp. Pl. 644. Willd. n. 5. (Sefamoides falmanticum parvum

primum; Cluf. Hist. v. 1. 296, excluding the figure. S. foliis crassis, floribus ex herbaceo purpurascens; Tourn. Inst. 424.)—Leaves linear, obtuse. *Styles* five.—Native of Spain. *Læfing*.—*Stems* several, a span high, simple, leafy. *Leaves* scattered, the length of the nail, linear, obtuse, smooth. *Cluster*, or rather *spike*, long, lax. *Petals* very white, much divided. *Styles* five, sometimes, as Clusius describes them, only four. *Capful*e with as many protuberant, single-seeded, knobs or pouches.

6. *R. sefamoides*. Spear-leaved Base Rocket. Linn. Sp. Pl. 644. Willd. n. 6. Ait. n. 5. (Sefamoides parvum falmanticum; Cluf. Hist. v. 1. 295, the figure only. Ger. Em. 493. Lob. Ic. 353.)—*Stem-leaves* linear-lanceolate, obtuse, radical ones lanceolate, stalked, much larger. *Fruit* stellated.—Native of Barbary, and the south of Europe. A hardy annual in Kew garden, flowering in July and August. The *root* is spindle-shaped, very long, tapering, and branched at the extremity. *Stems* numerous, spreading nearly horizontally, from three to twelve inches long, generally simple, smooth, leafy. *Radical-leaves* numerous, lanceolate or somewhat obovate, entire, smooth, an inch long, tapering down into a *footstalk* of about the same length; *stem-leaves* much smaller and narrower, linear, and obtuse. *Clusters* terminal, rather dense. *Petals* white. *Styles* four or five. *Capful*e of the same number of spreading lobes, fringed at the edges, and assuming a star-like figure.—The wooden cut of Clusius so exactly represents this plant, especially the radical *leaves*, that we can take it for no other. Allioni's plate, t. 88. f. 3, does not accord with this, or any other *Reseda* known to us, except having a general resemblance to *canescens*, n. 2, without its roughness, or the undulations of its *leaves*.

7. *R. fruticulosa*. Shrubby Base Rocket. Linn. Sp. Pl. 645. Willd. n. 7. Ait. n. 6. Jacq. Coll. v. 3. 195. Ic. Rar. t. 474.—Leaves pinnate. *Stem* shrubby in the lower part. *Styles* three or four. *Petals* all three-cleft. *Calyx* in five spreading segments.—Native of Spain, and other parts of the south of Europe. John Symmons, esq. is recorded by Mr. Aiton as having introduced it into England, in 1794. The *root*, and base of the *stem*, are woody and perennial, producing a number of upright, less durable, *branches*, two or three feet high, leafy, subdivided, smooth, round, with elevated ribs. *Leaves* alternate, stalked, pinnate, of five, seven, or many more, lanceolate, entire, decurrent, smooth *leaflets*, seldom regularly opposite; the terminal one much the largest, sometimes, but not always, recurved at the point; the lower ones gradually smallest. *Clusters* terminal, erect, long, and rather lax. *Petals* five, white, uniform, oblong, all cut, not nearly half way down, into three equal segments. *Styles* often four; sometimes but three. *Stamens* eleven. Linnæus thought it an intermediate species between *alba* and *undata*. From the first of these it is very distinct. By an accidental error in Sp. Pl. the present species is there called *suffruticulosa*, which has led to the same inaccuracy in the Prodr. Fl. Græc. n. 1092. The name is correct in Herb. Linn.

8. *R. alba*. White Base Rocket, or Upright Mignonne. Linn. Sp. Pl. 645. Willd. n. 8. Ait. n. 7. Sm. Fl. Græc. Sibth. t. 459, unpublished. (R. maxima; Bauh. Pin. 100. Lob. Ic. 222. Ger. Em. 277.)—Leaves pinnate. *Stem* erect, branched. *Styles* three or four. *Petals* unequally and deeply five-cleft. *Calyx* in five spreading segments.—Native of Spain and the south of France; as well as of Greece and the island of Zante. It has been cultivated in our gardens ever since the days of Gerarde, being a hardy annual or biennial, ornamented, throughout the summer, with copious dense *spikes*, of elegant white *flowers*, whose *petals* have deeper, more numer-

RESEDA.

ous segments, than the foregoing. Otherwise their parts of fructification do not much differ. The number of *styles*, and of segments of the *calyx*, varies in both, according to luxuriance. The *leaflets* of *alba* are more numerous, as well as more equal in size, than in *fruticulosa*, nor is the terminal one larger than the rest. Sometimes their edges are roughish. Dr. Sibthorp observed, that the whole herb, and also the bruised seed, were used in Zante to dye silk yellow.

9. *R. undata*. Wave-leaved Bafe Rocket. Linn. Sp. Pl. 644. Willd. n. 9. Ait. n. 8. (*R. decurva*; Forfk. Ægypt-Arab. cat. 66. *R. minor alba*, *dentatis foliis*; Barrel. Ic. t. 588.)—Leaves pinnate, wavy. Styles three to five. Petals unequally cut.—Native of Spain. Cultivated by Miller, at Chelsea, in 1739. A hardy perennial, flowering in summer. The *stems* are erect, branched, straight and wand-like, one to two feet high. *Leaves* unequally pinnate, very much crisped, or wavy. *Flowers* smaller than in either of the last, and of a less pure white, composing very long *clusters*, or rather *spikes*, for each flower is nearly sessile; the lower ones very remote. Some of the *petals* appear, by the dried specimens, to have three, others five, obtuse segments, of which the lateral ones are broadest. We have great doubts, whether the specimen from which Linnæus took his remark of the great size of the *capsules*, really belongs to this species.

10. *R. lutea*. Yellow Bafe Rocket, or Wild Mignonette. Linn. Sp. Pl. 645. Willd. n. 10. Ait. n. 9. Fl. Brit. n. 2. Engl. Bot. t. 321. Jacq. Austr. t. 353. Bulliard. t. 281. (*R. Plinii*; Ger. Em. 277.)—All the leaves three-cleft; the lower ones pinnate. Petals six, very unequal. Calyx in six segments.—Native of dry chalky hills in the temperate and southern countries of Europe; abundant in the chalky parts of England, flowering from June to the end of autumn. The *root*, generally annual with us, often survives a mild winter. *Stems* spreading, branched, leafy, a foot or more in height. *Leaves* tapering at the base; some of them with only one pair of lateral leaflets; others with many, which are occasionally subdivided; all the leaflets, or segments, are linear, channelled, more or less wavy; frequently very much crisped or curled. Such is the variety, mentioned as a species, by Dillenius, in Raii Syn. 366, as *R. crispa gallica*, Bocc. Sic. 77. t. 41. f. 3; but we have often suspected, that Bocccone's plant might be the *undata*. It is hazardous, however, to depend much on such imperfect materials as he affords. The *flowers* are numerous, sulphur-coloured, slightly, and not agreeably, odorous; their two upper petals with two fan-like lateral lobes, and a short linear one between; two lateral petals very unequal and variously three-cleft; two lower ones narrow, and almost simple.

11. *R. Phyteuma*. Scentless Mignonette. Linn. Sp. Pl. 645. Willd. n. 11. Ait. n. 10. Jacq. Austr. t. 132. (*Resedæ affinis Phyteuma*; Bauh. Prodr. 42. *Erucago apula*, *trifida et quinquefolia*; Column. Ecphr. 267. t. 269. f. 2.)—Leaves undivided, or three-lobed. Calyx in six, very large, obovate segments. Petals four, more or less pectinated.—Native of the south of Europe and north of Africa. On the walls of Rome it is very common, and having a general resemblance, without the fragrance, of our garden mignonette, it has given rise to a report of that charming flower being destitute of scent in Italy! Miller cultivated *R. Phyteuma* at Chelsea, where it still springs up annually in the garden. The *root* is long and tapering. *Stems* very numerous, a span high, composing a large spreading tuft. *Leaves* broadish, tapering at the base; some of them simply obovate; others with a pair of lateral lobes. *Flowers* cream-coloured, in lax simple clusters. *Calyx* very much enlarged, and reflexed, after flowering.

Petals four; the lower pair, in particular, elegantly pectinated at one side; but all of them are liable to vary, in the number and depth of their segments. *Fruit* pendulous, obovate, angular. *Styles* three.

12. *R. mediterranea*. Mediterranean Mignonette. Linn. Mant. 564. Willd. n. 12. Ait. n. 11. Jacq. Coll. v. 1. 147. Ic. Rar. t. 475.—Leaves flat, undivided, or three-lobed. Calyx much shorter than the corolla. Petals six, very unequal.—Native of Palestine, according to Linnæus, who received it from Schreber. Dr. Sibthorp met with it in corn fields in the islands of the Archipelago. This is a hardy annual, flowering all summer long, agreeing very much in appearance with the last, but still more with the following. The *flowers* have no scent. Their *petals* are six, most resembling those of *R. lutea* in figure, but white, not yellow. The *leaves* are broader, and less divided, than in *lutea*, as well as quite flat; they vary however greatly in breadth, but are never undulated. The *calyx* is short, never enlarged like that of *R. Phyteuma*.

13. *R. odorata*. Sweet Mignonette. Linn. Sp. Pl. 646. Willd. n. 13. Ait. n. 12. Mill. Ic. t. 217. Curt. Mag. t. 29.—Leaves flat; undivided, or three-lobed. Calyx equal to the corolla: Segments of the petals all very deep, somewhat spatulate.—Native of Egypt. Well known throughout the gardens of Europe, as a hardy annual, blooming all the year round, if properly sheltered, and exhaling from its neat unobtrusive flowers, a most delicious scent, resembling that of the vine-blossom, or the fruit of the raspberry. This odour remains long in wooden boxes, where the flowers are dried. The *petals* are of a pale buff, prettily contrasted with the red anthers, and, as Jacquin observes, in describing the last, they differ from that in their uniform, long, wedge-shaped, or spatulate segments.

RESEDA, in *Gardening*, contains a plant of the flowering sweet-scented kind, of which the species cultivated is, the sweet reseda, or mignonette (*R. odorata*).

Mr. Curtis observes, that the luxury of the pleasure-garden is greatly heightened by the delightful odour which this plant diffuses; and as it grows more readily in pots, its fragrance may be conveyed into the house: its perfume, though not so refreshing perhaps as that of the sweet-briar, is not apt to offend the most delicate olfactories.

Method of Culture.—This is raised from seed, which should be sown on a moderate hot-bed in March, and when the plants are strong enough to transplant, be pricked out upon another moderate hot-bed to bring them forward, having a large share of air in warm weather, to prevent their drawing up weak. Or they may be sown in pots of light mould, and plunged in the hot-bed, which is probably the better practice. In the first mode, about the end of May the plants may be planted out, some into pots, to place in or near the apartments, and others into warm borders, where they may remain to flower and seed. The plants which grow in the full ground, often produce more seeds than those which are in pots; but at the time when the seed-vessels begin to swell, the plants are frequently apt to be infested with green caterpillars, which, if they are not destroyed, eat off all the seed-vessels.

And when the seeds are sown on a bed of light earth in April, the plants come up very well; and when not transplanted, grow larger than those which are raised in the hot-bed; but they do not flower so early, and in cold seasons scarcely ripen their seeds. In a warm dry border, however, the seeds often come up spontaneously, and grow very luxuriantly; but to have the flowers early in spring, the seeds should be sown in pots in autumn, being kept in frames through the winter, or on a gentle hot-bed in spring. The plants may also be preserved through the winter in a greenhouse, where they

they continue flowering most part of the year, but the second year they are not so vigorous as in the first.

It is cultivated for the fine fragrant smell which it affords, when pots of it are set about the house.

The seed becomes ripe in the beginning of the autumn, when it should be carefully collected in a dry season, and put by in a dry place for future use, after having been properly cleaned.

RESEISER, RESEISIRE, in *Law*, a taking of lands into the king's hands, where a general delivery, or ouster le main, was formerly misused, contrary to order of law.

RESELE, in *Geography*, a town of Sweden, in Angermannland; 55 miles N.N.E. of Hernofand.

RESEMBLANCE. See SIMILITUDE.

RESENIUS, JOHN PAUL, in *Biography*, a Danish bishop and writer, was born at Resen in 1561. He studied at various schools, and in 1583 became subdirector of that at Viborg. Some time after he travelled into foreign countries, took a degree at Wittemberg, and returned to Denmark in 1591. He was afterwards appointed professor of logic and theology in the university of Copenhagen, and received orders to accompany Christian IV., who proposed a visit to England to see his relation, king James. In consequence of another royal mandate, he undertook to translate the whole of the scriptures into Danish. He completed the New Testament first, which he published in two vols. 12mo. in 1605, and the Old Testament followed in 1607. This version of the bible gave rise, in 1609, to a controversy between Resenius and Ivarus Stubæus, professor of Hebrew at Copenhagen, the result of which was, that Stubæus was displaced from his office. In 1614 he was involved in another dispute with Olaf Coccius, the clergyman of Nicolas' church, Copenhagen, which ended in the disgrace and banishment of his opponent. Resenius was raised to the episcopal chair. He died in 1638, and bequeathed upwards of 5000 dollars to charitable purposes. He was author of many works, chiefly on subjects connected with theology. Gen. Biog.

RESENIUS, PETER, counsellor of state in Denmark, was born at Copenhagen in 1625, and in 1646 he went to Leyden, where he applied himself to the study of jurisprudence and the belles lettres during the space of four years, and then made a tour to France, Spain, and Italy. He took the degree of L.L.D. at Padua, and then returned to Copenhagen, where he married in 1655, and two years after was appointed professor of moral philosophy. In 1680 he was ennobled, and in 1684 was nominated a counsellor of state. This learned man died in 1688, and bequeathed a large sum of money, and a very valuable library, to the university of Copenhagen. He was author of a great number of works, the titles of which are enumerated in the General Biography.

RESENTMENT is a lesser degree of wrath, which is violent and permanent anger, and is excited by smaller offences, or by offences committed against less irritable minds: it is a deep reflective displeasure against the conduct of the offender. Indignation is a resentment against a conduct that appears peculiarly unworthy:—some atrocious violation of the principles of gratitude, or something which appears peculiarly despicable and base. Resentment is chiefly excited by some personal offence against the laws of social intercourse, of friendship, or of gratitude, and may terminate in indifference, and, in weak minds, in malice; but it is usually appeased by concessions and acknowledgments.

RESERVATION, RESERVATIO, in *Law*, an action or clause by which something is reserved, *i. e.* is retained, kept, or secured to one's self.

Thus, when a man lets his land, he reserves a rent to be paid to himself for his maintenance, &c.

William the Conqueror, getting all the lands of England, except those belonging to the church and religious houses, into his hands by right of conquest, bestowed a great part of them among his followers, reserving some retribution of rents and services to him and his heirs; which reservation is now, as it was before the Conquest, called the tenure of the lands.

Sometimes reservation signifies as much as an exception; as, when a man lets a house, and reserves to himself one room, that room is excepted out of the demise.

RESERVATION, *Mental*, is a proposition, which, strictly taken, and according to the natural import of the terms, is false; but if qualified with something reserved or concealed in the mind, becomes true.

Mental reservations are the great refuge of religious hypocrites, who use them to accommodate their consciences with their interests. The Jesuits are zealous advocates for mental reservations; yet are they strictly all real liars, as including an intention to deceive.

RESERVATORY. See RESERVOIR.

RESERVE, in *Law*, the same with *reservation*; which see.

Benefices are sometimes resigned with reserve of a pension. By the canon law, no person may reserve to himself a pension out of a benefice, unless he hath served it ten years.

In the Romish church the ordinary priests have only a power to absolve, in reserve of certain cases, hence called *reserved cases*, as being reserved to the bishop.

The court reserves the cognizance of such an affair to itself. The lawyers say, that no prince ever granted such a power by his letters or patents, but that he reserves to himself a greater.

RESERVE, *body of, corps de reserve*, in *War*. See BODY of *Reserve*.

RESERVE *Guard* denotes the same as a *picquet* guard, except that the one mounts at troop-beating, and the other at retreat-beating. See *GUARD*.

RESERVED CASES. See *CASES*.

RESERVOIR, a large pond or pen of water, artificially made, in order to retain and collect it for the use of canals, rivers, mills, &c. See *BASON* and *CANAL*.

The reservoir in a building is a large bason, usually of wood, lined with lead, where water is kept to supply the occasions of the house. At Cannons, the late noble seat of the duke of Chandos, there was a very large reservoir at the top of the house, to which the water was raised by a curious engine, contrived for the purpose. This reservoir was of such capacity, as that, besides supplying all parts of the house by means of pipes and cocks, it likewise turned a mill.

The reservoir is sometimes also a large bason of strong masonry, clayed or paved at the bottom, where the water is reserved to feed jets d'eau, or spouting fountains.

Such is that large one on the top of Marley, called *tron d'enfer, hell mouth*, whose surface, Daviler tells us, contains fifty acres, and its depth such as to contain a hundred thousand cubic fathom of water.

Reservoirs are of great use in collecting and preserving the urine or other liquid matters discharged from the sheds or stables where cattle or other animals are kept, for the purpose of manure, and should of course be formed on all farm-yards. See *FARM-YARD*.

Such a reservoir is conceived to be essential, even where there are no lands proper for being overflowed by the contents of it, particularly where care is taken to supply it occasionally with a bottom of some good rich earthy matter,

to be imbued with the rich particles of the more heavy substances which are let fall during the stagnant state of the liquid. This matter should be carried out in a dry time, when the water has been wholly removed by evaporation, and be spread out over the grass lands, particularly those under the scythe, as soon as possible after the hay has been taken off the ground. The benefit of a reservoir of this nature, whether formed in the intention of flowing the land below it, or of a pond for catching the mud, will commonly be in the proportion of its extent. And the cost of it will have a relation likewise to its dimensions. It is supposed, that if the expence of one be ten pounds, and the annual increase of hay only one load, the farmer may well afford to pay *fix per cent.* for the use of it. Therefore such reservoirs seldom fail to pay amply for the cost of preparing them. In some sloping situations they may be constructed at a very trifling expence, in comparison of their usefulness, when intended to be thrown over grass lands, with a valve, by which, when full, the liquid may be let off, in a sufficient body, to spread equally over the whole of the part to which it is applied, and produce the full effect that is wanted.

RESERVOIR, in *Anatomy*. See RECEPTACULUM *Clyli*.

RESET, in *Law*, the receiving or harbouring an outlawed person. Hence a receiver of an outlawed person is called a *refetter*.

RESHD, or RESHT, in *Geography*, a town of Persia, and capital of the province of Ghilan, built on the shore of the Caspian, and carrying on a considerable trade in silk, and other articles, with Astrachan. The number of houses, which lie dispersed, is estimated at 2000. The heat in summer is hardly supportable, and dangerous, when a particular wind blows, but happily it does not continue above a quarter of an hour. The harbour is unsafe in stormy weather, so that the commanders of ships generally prefer that of Lankeroon, a small port in the district of Talish, to the N.W. of Resht. Rice and wheat are cultivated in its vicinity; 300 miles N. of Isfahan. N. lat. 37° 20'. E. long. 49° 50'. The province of Ghilan yields a net revenue of 149,490 tomauns, and 9058 dinars.

RESIANCE, RESIANTIA, in *Law*, a man's abode, or continuance in a place.

The word has the same signification with regard to laymen, as *residence* with regard to ecclesiastics.

Glanville observes, that in the ancient law, *resiance* properly signified a disease, by which the person was disabled from stirring out of doors. Whence their *essoin de resiantia*, was the same as our *essoin de malo lecto*.

RESIANT ROLLS, are rolls in which the resiants of a titling, &c. are set down.

RESIDENCE, RESIDENTIA, in *Canon and Common Law*, the abode of a person, or incumbent, upon his benefice; and his assiduity in attending on the same.

By the rule of the ancient canon law, beneficiaries are obliged to residence, without just and necessary cause, and especially without the consent of the diocesan, under pain of deprivation of their benefices. The original reason is, that in the primitive church none were promoted to holy orders, but such as had a benefice in promptu, which they were obliged to serve; so that this service was necessarily attached to the orders; and whoever was honoured with them, at the same time was obliged to personal service.

Regularly, personal residence is required of ecclesiastical persons upon their cures; and to that end, by the canon law, if he that hath a benefice with cure be chosen to an office of bailiff, or beadle, or the like secular office, he may have the king's writ for his discharge. The intendment of the common law is that a clerk is resident upon his cure. 2 Inst. 625.

Residence is also required by statute 9 Ed. II. stat. 1. c. 8, called the statute *articuli cleri*. Thus also, by 21 Henry VIII. c. 13, commonly called the statute of non-residence, persons wilfully absenting themselves from their benefices for one month together, or two months in the year, incur a penalty of 5*l.* to the king, and 5*l.* to any person that will sue for the same. And if any person or persons shall procure at the court of Rome, or elsewhere, any licence or dispensation to be non-resident at their said dignities, prebends, or benefices, contrary to this act; every such person, putting in execution any such dispensation or licence for himself, shall incur the penalty of 20*l.* for every time so doing, to be forfeited and recovered as aforesaid, and such licence or dispensation shall be void. f. 27.

Provided, that this act of non-residence shall not extend nor be prejudicial to any such spiritual person as shall chance to be in the king's service beyond the sea, nor to any person going to any pilgrimage or holy place beyond the sea, during the time that they shall be in the king's service, or in the pilgrimage going and returning home; nor to any scholar or scholars being conversant and abiding for study, without fraud or covin, at any university within this realm or without; nor to any of the chaplains of the king or queen, daily or quarterly attending and abiding in the king's or queen's most honourable household; nor to any of the chaplains of the prince or princess, or any of the king's or queen's children, brethren, or sisters, attending daily in their honourable households, during so long as they shall attend in any of their households; nor to any chaplain of any archbishop or bishop, or of any spiritual or temporal lords of the parliament, daily attending, abiding, and remaining in any of their honourable households; nor to any chaplain of any duchess, marquess, countess, viscountess, or baroness, attending daily, and abiding in any of their honourable households; nor to any chaplain of the lord chancellor, or treasurer of England, the king's chamberlain, or steward of his household for the time being, the treasurer and controller of the king's most honourable household for the time being, attending daily in any of their honourable households; nor to any chaplain of any of the knights of the honourable order of the garter, or of the chief justice of the king's bench, warden of the ports, or of the master of the rolls, nor to any chaplain of the king's secretary, dean of the chapel, amner for the time being, daily attending and dwelling in any of their households, during the time that they shall so abide and dwell, without fraud or covin, in any of the said honourable households; nor to the master of the rolls, or dean of the arches, nor to any chancellor or commissary of any archbishop or bishop, nor to as many of the twelve masters of the chancery, and twelve advocates of the arches, as shall be spiritual men, during so long time as they shall occupy their said rooms and offices; nor to any such spiritual persons as shall happen by injunction of the lord chancellor, or the king's council, to be bound to any daily appearance and attendance to answer to the law, during the time of such injunction. f. 28.

Provided also, that it shall be lawful to the king to give licence to every of his own chaplains, for non-residence upon their benefices; any thing in this act to the contrary notwithstanding. f. 29.

Provided also, that every duchess, marquess, countess, baroness, widows, which shall take any husbands under the degree of a baron, may take such number of chaplains as they might have done being widows; and that every such chaplain may have like liberty of non-residence, as they might have had if their said ladies and mistresses had kept themselves widows. f. 33.

Legal residence is not only in the parish, but also in the parsonage

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parsonage house ; for it hath been resolved, that the statute intended residence, not only for serving the cure, and for hospitality, but also for maintaining the house, that the successor also may keep hospitality there. 25 Hen. VIII. cap. 16. 33 Hen. VIII. cap. 28. 28 Hen. VIII. cap. 13.

On a review of these statutes, a question has occurred, how far, taken together, they supersede the canon law, so as to take away the power which the ordinary had before, of enjoining residence to the clergy of his diocese. It seems to be clear, that before these statutes, the bishops of this realm had and exercised a power of calling their clergy to residence ; but more frequently, they did not exert this power, which so far forth was to the clergy a virtual dispensation for non-residence. But this not exerting of their power was in them not always voluntary ; for they were under the controlling influence of the pope, who granted dispensations of non-residence to as many as would purchase them, and disposed of abundance of ecclesiastical preferments to foreigners, who never resided here at all. The king also, as appears, had a power to require the service of clergymen ; and consequently in such case to dispense with them for non residence upon their benefices. This power of the king is referred to him by the aforesaid act of the 21 Hen. VIII. c. 13. But it is the power of dispensation in the two former cases which is intended to be taken away, namely, by the bishop, and by the pope ; and by the said act residence is enjoined to the clergy, under the penalty therein mentioned, notwithstanding any dispensation to the contrary, from the court of Rome or elsewhere ; with a proviso nevertheless, that the said act shall not extend nor be prejudicial to the chaplains and others therein specially excepted. It is argued, that this act being made to rectify what had been insufficient or ineffectual in the canon law, and inflicting a temporal penalty to enforce the obligation of residence, the parliament intended that the said act should be, from thenceforth, if not the sole, yet the principal rule of proceeding in this particular ; and consequently, that the persons excepted in the act need no other exemption than what is given to them by the act of their non-residence. Unto this it is answered, that the intention of the act was not to take away any power which the bishop had of injoining residence, but the contrary ; namely, it was to take away that power which the bishop or pope exercised, of granting dispensations for non-residence, that is to say, the act left to them that power which was beneficial, and only took from them that which tended to the detriment of the church ; and, consequently, that the bishop may injoin residence to the clergy as he might before, only he may not dispense with them as he did before for non-residence. And indeed, from any thing that appears upon the face of the act, the contrary supposition seemeth to bear somewhat hard against the rule which hath generally been adhered to in the construction of acts of parliament, that an act of parliament in the affirmative doth not take away the ecclesiastical jurisdiction, and that the same shall not be taken away in any act of parliament, but by express words. It is therefore further urged, that the three subsequent acts do explain this act, and by the express words thereof do establish the foregoing interpretation. In the first of the three it is said, that the persons therein mentioned may retain one chaplain *which may be absent from his benefice, and not resident upon the same* ; in the second it is said, that persons above forty years of age, residing in the universities, *shall not be excused of their non-residence*, and again, that persons under forty years of age, *shall not enjoy the privilege of non-residence contained in the proviso of the said former act*, unless they perform the common exercises there, and the like, which implies, that if they do

this, they shall enjoy such privilege : and in the third, it is said, that the persons therein mentioned may retain one chaplain, *which may be absent from his benefice, and non-resident upon the same* ; and it is not to be supposed, that the parliament intended a greater privilege to the chaplains of the inferior officers mentioned in the said last act, than to the chaplains of the royal family and principal nobility mentioned in the first act. Unto this the most apposite answer seemeth to be, that it is not expressed absolutely in any of the said three acts, that the chaplains or others therein mentioned shall enjoy the privilege of non-residence, or may be absent from their benefices, and not resident upon the same ; but only this, that they may be absent or non-resident as aforesaid, *the said statute made in the said twenty-first year, or any other statute or ordinance to the contrary notwithstanding*. So that they are only exempted thereby from the restraints introduced by the statute law ; but in other respects are left as they were before.—But concerning this, although it is a case likely enough to happen every day, there hath been no adjudication.

By 43 Geo. III. c. 84. it is enacted, that so much of 21 Hen. VIII. c. 13. as imposes the penalty of ten pounds on any spiritual person who shall not keep residence on one of his dignities, prebends, or benefices, but absent himself one month together, or two months, to be accounted at several times, in any one year, shall be, and the same is hereby repealed ; and that every spiritual person, being possessed of any archdeaconry, deanery, or other dignity, prebend, benefice, donative, or perpetual curacy, or parochial chapelry, who shall, without sufficient cause, as in the said act, or the 25 Hen. VIII. c. 16. or in 28 Hen. VIII. c. 13. or in 33 Hen. VIII. c. 28. is specified, or such other sufficient cause as would exempt such spiritual person from any of the pains, penalties, and forfeitures under the said recited acts, for any non-residence, and who shall not have any such licence or exemption as is in this act mentioned, wilfully absent himself therefrom for three months together, or to be accounted at several times in any one year, and make his residence at any other place or places, except at some other dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, of which he may be possessed, shall, when such absence shall exceed such period, and not exceed six months, forfeit and pay one-third of the annual value of the dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, from which he shall so absent himself ; and when such absence shall exceed six months, and not eight months, one-half of such annual value ; and when such absence shall exceed eight months, two-thirds of such annual value ; and when such absence shall have been for the whole of the year, three-fourths of such annual value ; to be recovered by action of debt, bill, plaint, or information, in any of his majesty's courts of record at Westminster, or the courts of great sessions in Wales, wherein noessoign, privilege, protection, or wager of law, or more than one imparlance, shall be allowed ; and the whole of every such penalty or forfeiture shall go and be paid to the person or persons who shall inform and sue for the same, together with such costs of suit as shall be allowed ; provided that no parsonage that hath a vicar endowed, or perpetual curate, and having no cure of souls, shall be taken to be or be comprehended under the name of benefice, within the meaning of this act. s. 12.

No spiritual person holding any office, in such manner as the same, under any of the provisions of the said recited acts, would exempt such spiritual persons from residence, or from the penalties and forfeitures in the said acts contained for non-residence, or actually serving as a chaplain of the house of commons, or as a clerk of his majesty's closet, or as

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a deputy clerk thereof, or as a chaplain general of his majesty's forces, or brigade chaplain on foreign service, or chaplain on board any of his majesty's ships, or of his majesty's dock yards, or in any of his majesty's garrisons, or chaplain of his majesty's corps of artillery, or as chaplain to any British factory, or in the household of any British ambassador or public minister residing abroad, or as chancellor or vicar-general, or in his absence the principal surrogate or official in any ecclesiastical court of any diocese, or as minor canon, or vicar choral, or priest, vicar, or any such other public officer in any cathedral or collegiate church, or as deans, sub-deans, priests, or readers in his majesty's royal chapels at St. James's and Whitehall, or as reader in his majesty's private chapel at Windsor, or elsewhere, or as chaplain at the royal military asylum at Chelsea, or royal military college at High Wycombe, or teacher at the royal military academy at Woolwich, or chaplains at the royal hospitals at Greenwich and Chelsea, or as chaplains to the royal hospitals for seamen at Haslar and Plymouth, or as a preacher or reader in any of the inns of court, or at the rolls, or as burfcar, dean, vice-president or public tutor or chaplain, or other such public officer, in any college or hall, in either of the universities of Oxford or Cambridge, or as public librarian or public registrar, or proctor, or public orator, or other such public officer, in either of the said universities, or as fellow of any college in either of the universities, or of Eton or Winchester college, or as warden or provost of Eton or Winchester college, or as schoolmaster or usher in the same, or as schoolmaster or usher of Westminster-school, during the period that they shall respectively be required, by reason of any such office, to perform the duties of the same, and actually shall perform the duties of the same, shall be liable to any of the pains, penalties, or forfeitures in the said first recited act or this act contained, for or on account of any non-residence on any dignity, prebend, benefice, donative, or perpetual curacy. f. 15.

It shall be lawful for any bishop to grant licences to spiritual persons within his diocese, to reside out of the proper house of residence, or out of the parish, and within such distance therefrom, as the case may appear to such bishop to require, if such bishop shall, in his discretion, think the same fit and proper, in the several cases hereinafter mentioned; (that is to say,) to any spiritual person who shall be prevented from residing in the proper house of residence, or in the parish, by actual illness of himself, or wife or child; and also to any spiritual person having any dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, where there shall be no house of residence, or where the house of residence shall be unfit for the residence of such ecclesiastical person, such unfitness not being occasioned by such ecclesiastical person, such spiritual person keeping such house in such repair as shall be to the satisfaction of the bishop; and also to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry, and having any mansion or messuage belonging to himself or any relative, to reside in such mansion or messuage, such spiritual person keeping the house of residence in good repair, to the satisfaction of the bishop; and also to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry, of small value, and serving as a stipendiary curate elsewhere, with licence, and providing for the serving of such his benefice, donative, perpetual curacy, or parochial chapelry, to the satisfaction of the bishop of his diocese; and also to any master or usher of any endowed school duly licensed by the bishop, and actually employed in teaching therein, or to the master of any other

school who now is or shall be, within one month after the passing of this act, duly licensed by the bishop; and also to any master or preacher of hospitals or incorporated charitable foundation, during the period for which he may be required to reside in the same, and shall actually reside and perform his duties therein; or to any person holding any endowed lectureship, chapelry, or preachingship, and performing the duties thereof respectively; or to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry of small value, and serving as preacher in any proprietary chapel in cities or towns, with the licence of the bishop in whose diocese he shall so officiate; or to the librarians of the British museum, or of Sion college; or to the trustees of lord Crewe's charity, during the times of their personal attendance on the duties of their office: provided always, that for any such licence, the party obtaining the same shall not pay more than the sum of ten shillings, exclusive of any such stamps as may be required by law: provided always, that if any spiritual person, applying to any bishop for any such licence, shall think himself aggrieved by the refusal thereof, it shall be lawful for such spiritual person to appeal to the archbishop of the province, who shall confirm such refusal, or grant a licence under this act, as shall seem just and proper. f. 19.

It shall be lawful for any bishop, in cases not enumerated, to grant licences to reside out of the proper house of residence, or out of the parish, and to assign to a curate such salary as he shall judge fit: provided, that in every such case, the reasons that have induced such bishop to grant such licence shall be transmitted to the archbishop of the province to which such bishop shall belong, who shall allow or disallow such licence, in the whole, or in part, or make any alteration therein, as to the period for which the same may have been granted, or otherwise, and likewise as to the stipend assigned to the curate, as to such archbishop shall seem fit; and no such licence shall be good unless it shall have been so allowed and approved by such archbishop: provided also, that no licence shall be made void by the death or removal of the bishop or archbishop granting the same, but the same shall be good and valid, unless the same shall be revoked by the next or any succeeding bishop or archbishop: provided also, that any spiritual person may appeal against any such revocation by the bishop alone: provided also, that the respective archbishops may, in their respective dioceses of which they are bishops, grant licences in all cases in which any licences may be granted by any bishop, either by his own authority, or with the allowance and approval of the archbishop as aforesaid: provided also, that it shall be lawful for any such archbishop to order reasonable fees and charges to be paid by any such spiritual person appealing: provided always, that in every case when any costs and charges directed by such archbishop or bishop as aforesaid, shall remain unpaid for the period of twenty-one days after demand thereof, it shall be lawful for such bishop or archbishop to cause the same to be recovered by sequestration. f. 21.

Provided always, that it shall be lawful for any bishop or archbishop to revoke any such licence: provided also, that no licence for non-residence granted under this act shall continue in force for more than two years from the granting thereof.

Every bishop or archbishop shall cause a copy of such licence or revocation to be filed in the registry of the diocese; and a list shall be made out by the register of the said diocese, and entered in a book, and kept for the inspection of all persons; and a copy of every such licence and revocation shall be transmitted to the churchwardens of the parish to which the same relates, within one month after the granting thereof.

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thereof, to be by them deposited in the parish chest; and a copy of the same shall likewise be read at the visitation of the archdeacon. f. 22.

Provided, that during the vacancy of any see, the power of granting licences under this act shall be exercised by the vicar-general of the diocese; and that during the absence of any prelate out of the realm, or such infirmity as disables him from exercising in person the functions of his office, it shall be exercised by such person or persons as is or are lawfully empowered to exercise his general jurisdiction in the diocese. f. 28.

And nothing in this act shall exempt any person or persons from any canonical or ecclesiastical censures, or affect any proceedings in any ecclesiastical court, in relation to non-residence, not being duly licensed according to the provisions of this act, to be absent therefrom, nor having any other lawful cause of absence; provided no such censures, by reason of any non-residence, not exceeding three months in any one year, shall be put in force at the suit or instance of any person or persons other than the archbishop, bishop, or archdeacon. f. 29.

In every case in which it shall appear to any bishop or archbishop, that any spiritual person, not being licensed according to this act, nor having any other lawful cause of absence, does not sufficiently reside, it shall be lawful for such bishop or archbishop to issue a monition to such spiritual person, to reside thereon, and to make a return to such monition within a certain number of days after the issuing thereof; so as that there shall be thirty days between the time of executing such monition, and the time specified for the return thereto; and it shall be lawful for the bishop or archbishop to whom any such return shall be made, to require such return to be verified by the oath of such spiritual person, or others; and where no such return shall be made, or where such return shall not be deemed satisfactory, it shall be lawful for such bishop or archbishop to issue an order to require such person to proceed to and reside, within thirty days after such order shall have been delivered; and in case of non-compliance, to sequester the profits of such benefice, donative, perpetual curacy, or parochial chapelry of such spiritual person, and to direct the application of such profits, after deducting the necessary expences of serving the cure, to the payment of such expences as shall have been incurred in relation to such monition and sequestration, and in the next place, towards the augmentation or improvement of any such parsonage, vicarage, donative, or perpetual curacy, or the house of residence, or any of the buildings and appurtenances, or any of the glebe or demesne lands; or may order and direct the same, or any portion thereof, to be paid to the governors of the bounty of queen Anne, to be applied as such bishop or archbishop shall in his discretion think fit; and it shall also be lawful for any such bishop or archbishop, within six months after such order for sequestration, or within six months after any money shall have been actually levied by such sequestration, to remit to any such spiritual person any part of such profits, or cause the same or any part thereof that shall have been paid to such governors of queen Anne's bounty, to be repaid to such spiritual person, in any case in which, by reason of the subsequent obedience of any such spiritual person, such bishop or archbishop shall think the same proper: provided, that when any such spiritual person shall think himself aggrieved by reason of any such sequestration, it shall be lawful for any such spiritual person to appeal to the archbishop, who shall make such order as shall be just and proper: provided, that the party so appealing shall give security to the bishop for the payment of ex-

pences occasioned by the appeal: provided also, that no such order for any sequestration shall be put in force during such appeal. f. 30.

Persons who shall return to residence on monition, shall pay the costs. f. 31.

If any person, returning to residence on monition, shall before six months thereafter absent himself, the bishop may, without monition, sequester the profits of the benefice. f. 32.

And if any clerk shall continue under any sequestration for non-residence for the space of three years, or shall incur three sequestrations in the said space of three years, not being relieved with respect to any of such sequestrations, upon appeal, the benefice shall become *ipso facto* void, and the patron or person entitled to present or nominate some clerk thereto, other than the clerk who shall have so continued under such sequestration or sequestrations. f. 33.

Provided, that if an action be brought before the issuing of the monition, the bishop or archbishop shall retain out of the profits of the benefice sufficient to satisfy the penalty and costs; but if at the time of filing the monition, no action shall have been commenced, none shall be brought afterwards. f. 36.

But nothing in this act contained shall affect his majesty's royal prerogative in the granting of dispensations for non-residence, nor any privilege of clerks retained in his majesty's service under the statute 9 Edward II. c. 8.— f. 40.

No archbishop or bishop having any dignity, prebend, benefice, donative, or perpetual cure, shall, by reason of non-residence, be subject or liable to any penalties or forfeitures. f. 41.

By 54 Geo. III. c. 175. bishops are empowered to punish past non-residence by monition and sequestration, as well as to compel residence in future, and to exercise the same powers of remitting or ordering the repayment of any part of such penalties as is directed or allowed in 43 Geo. III. c. 84. Persons may appeal, as under the last cited act, and penalties may be remitted; nor are penalties recoverable for more than one year. This statute repeals the provision of the former act 43 Geo. III. as to persons neglecting to notify the cause of exemption from residence, for which it is not necessary to obtain a licence, and enacts that a person chargeable with such neglect shall forfeit and pay for such offence the sum of 20*l.* to be levied by sequestration, if not otherwise paid after monition, to be applied as the archbishop or bishop of the diocese to whom the notification ought to have been made shall direct, who possesses the power of remitting or ordering the repayment of any part of such penalties, as is allowed in the said act, in cases of non-compliance with an order for residence. A person who has no house of residence, but who shall have resided nine months in the year within the limits of his benefice, donative, perpetual curacy, or parochial chapelry, shall not be liable to any penalties on account of non-residence, nor be obliged to take out any licence for it; but the same shall be deemed a legal residence; and in all returns made by the bishops, persons so residing shall be returned as resident. It is enacted also, that houses purchased by the governors of queen Anne's bounty, though not situated within the parishes for which they are purchased, shall be deemed residences; and in all cases of sinecure rectories having vicarages endowed, the residence of the vicar in the rectory house shall be deemed a sufficient legal residence.

For leases of non-residents, see LEASE.

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We observe here, that the act of 13 Eliz. c. 20, referred to under LEASE, which was at first temporary, but made perpetual by 3 Car I. c. 4, is repealed by 43 Geo. III. c. 84, as well as several other statutes, so far as they relate to it. This statute enacts, that spiritual persons may take houses, &c. though not in a city, &c. and such as have not sufficient glebe may, by consent of the bishop, take farms. They may also hold estates as property, but not any farm for cultivation, unless under a lease granted on or before Jan. 1, 1803, or by consent of the bishop. They may also buy or sell cattle or corn for the occupation of farms. Vicars or curates may take leases of the impropriate parsonages of their parishes; but if not occupied by a spiritual person before the passing of this act, the licence of the bishop is necessary. A licensed clergyman, or one exempt from residence, may occupy, where he resides, such lands as the bishop may allow. This statute is amended, in several respects, by 54 Geo. III. c. 175. By one clause in this last act, so much of 53 Geo. III. c. 149, as enacts that incumbents, neglecting to notify the death of a curate, shall lose his exemption from residence, or licence for non-residence, is repealed; and a penalty of 20*l.* is imposed.

By 53 Geo. III. c. 149. s. 2, the bishop or ordinary is empowered to appoint salaries to licensed curates; the licence specifying the amount of such salary; and curates may be directed to reside in the parsonage house in case of the non-residence of incumbents for four months in each year, during the said non-residence: but the distance of the residence of such curate, licensed to reside out of the parish, from any church or chapel which he shall be licensed to serve, shall not exceed five statute miles, except in cases of necessity, to be approved by the bishop or ordinary, and specified in the licence. The bishop may direct the curate to give up possession of the parsonage or vicarage house, and in case of refusal, he shall forfeit to the rector or vicar, all such parts of his stipend as shall then be unpaid, or shall thereafter become due, and also the sum of 50*l.* to such rector or vicar, recoverable in an action of debt. The salaries payable to curates shall be in proportion to the value of the benefices; in no case less than 80*l. per annum*, or than the annual value of the benefice, donative, perpetual curacy, or parochial chapelry, if the said value shall not amount to 80*l. per annum*; nor less than 100*l. per annum*, or the whole value as aforesaid, if the said value shall not amount to 100*l. per annum* in any parish or place where the population, (according to the returns then last made in pursuance of any act or acts of parliament,) shall amount to or exceed 300 persons; and such salary shall not be less than 120*l. per annum*, or the whole value as aforesaid, if the said value shall not amount to 120*l. per annum*, in any parish or place where the population shall appear as aforesaid to amount to or exceed 500 persons; and such salary shall not be less than 150*l. per annum*, or than the whole value as aforesaid, if the said value shall not amount to 150*l. per annum*, in any parish or place where the population shall appear, as aforesaid, to amount to or exceed 1000 persons: provided always, that the annual value of all benefices, donatives, perpetual curacies, or parochial chapelries, of which the said value, estimated as is herein provided, does not amount to 150*l. per annum*, shall be estimated from the returns made by the bishops of the several dioceses to the governors of queen Anne's bounty, in pursuance of an address of the house of lords, or from any future returns which may be made by the said bishops to the said governors, respecting parishes or places omitted in the said returns, or respecting parishes or places in the actual income of which it shall be

made appear to the said bishops that any considerable variation has taken place, either by augmentations made by the said governors or otherwise.

However, where the curate's salary is of the value of the benefice, it shall be liable to the charges affecting it. When the curate is permitted to serve in an adjoining parish, it shall be lawful for the bishop or ordinary to appoint for such incumbent, or perpetual curate, so licensed, a salary less by a sum not exceeding 30*l. per annum*, than the salary which in the several cases herein before mentioned the bishop or ordinary is respectively required by this act to appoint; and in every case where the bishop or ordinary shall find it necessary or expedient as aforesaid, to license one and the same person to serve as curate for two adjoining or other parishes or places, it shall be lawful for such bishop or ordinary to direct that during such time as such curate shall serve such two churches or chapels, the salary to be received by him for serving each of the said churches or chapels shall be less by a sum not exceeding 30*l. per annum*, than the salary which in the several cases herein before mentioned the bishop or ordinary is required by this act to appoint: Provided always, that no such salary shall in any case be less than 50*l. per annum*, or than the whole value of the said benefice, donative, perpetual curacy, or parochial chapelry, which such incumbent, perpetual curate, or curate, shall be licensed to serve, if the said value shall not amount to 50*l. per annum*: Provided always, that no incumbent, perpetual curate, or curate, shall be licensed to serve as curate in any church or chapel which is distant more than five statute miles from any church or chapel already served by such incumbent, perpetual curate, or curate, except in cases of necessity, to be approved by the bishop or ordinary, and specified in the licence.

In certain cases, smaller salaries are to be allowed to curates. The bishop is to allow the rector, &c. to deduct from the curate's salary for repairs to a limited amount, so that it shall not in any year exceed one-fourth part of the salary allotted to the curate. The curate is required, in certain cases, to pay the taxes of the parsonage house. Where the benefice, clear of all deductions, exceeds 400*l. per annum*, the bishop may assign to the curate of such parish or place, resident within the same, and serving no other cure, a salary of 100*l. per annum*, though the population may not amount to 300 persons; and if the population should amount to 500 persons, the bishop may assign to the curate any larger stipend or allowance, so that the same shall not exceed by more than 50*l. per annum* the amount of the stipend or allowance before specified, as required to be assigned to such curate. No licence shall be granted to serve more than two churches in one day; excepting only in certain cases, where three chapels or churches are not distant from each other more than four measured miles, the reasons for granting such licence being stated in it; and it is required that the residence of the curate be such, that it shall not be necessary for him to travel more than fifteen miles to perform his whole duty. An incumbent applying for licence for non-residence shall state what salary he proposes to give to his curate. See CURATE.

Bishops are not punishable by the statute of the 21 Hen. VIII. for non-residence upon their bishoprics; but although an archbishop or bishop be not tied to be resident upon his bishopric by the statutes; yet they are thereto obliged by the ecclesiastical law, and may be compelled to keep residence by ecclesiastical censures. (Watf. c. 37.) See also the constitutions of archbishop Langton, of Otho, and of Othobon. By canon 42, every dean, master, or warden, or chief governor of any cathedral or collegiate church, shall be resident in the same fourscore and ten days, *conjunctim* or *divisim*,

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divisim, in every year at the least, and then shall continue there in preaching the word of God, and keeping good hospitality; except he shall be otherwise let with weighty and urgent causes, to be approved by the bishop of the diocese, or in any other lawful sort dispensed with.

By can. 44 no prebendaries nor canons in cathedral or collegiate churches, having one or more benefices with cure, (and not being residentiaries in the same cathedral or collegiate churches,) shall, under colour of their said prebends, absent themselves from their benefices with cure above the space of one month in the year, unless it be for some urgent cause, and certain time to be allowed by the bishop of the diocese. And such of the said canons and prebendaries, as by the ordinances of the cathedral or collegiate churches do stand bound to be resident in the same, shall so among themselves sort and proportion the times of the year, concerning residence to be kept in the said churches, as that some of them always shall be personally resident there; and all those who be, or shall be residentiaries in any cathedral or collegiate church, shall, after the days of their residency appointed by their local statutes or custom expired, presently repair to their benefices, or some one of them, or to some other charge where the law requireth their presence, there to discharge their duties according to the laws in that case provided. And the bishop of the diocese shall see the same to be duly performed and put in execution.

So that, besides the general laws directing the residence of other clergymen, these dignitaries have another law peculiar to themselves, namely, the local statutes of their respective foundations, the validity of which local statutes this canon supposeth and affirmeth. And, with respect to the new foundations in particular, the act of parliament of the 6 Anne, c. 21. enacteth that their local statutes shall be in force, so far as they are not contrary to the constitution of the church of England, or the laws of the land. This canon is undoubtedly a part of the constitution of the church: so that if the canon interfereth in any respect with the said local statutes, the canon is to be preferred, and the local statutes to be in force only so far forth as they are modified and regulated by the canon.

There doth not appear to be any difference, either by the ecclesiastical or temporal laws of this kingdom, between the case of a rector and of a vicar concerning residence; except only that the vicar is sworn to reside, (with a proviso, unless he shall be otherwise dispensed withal by his diocesan,) and the rector is not sworn. And the reason of this difference was this: in the council of Lateran, held under Alexander III., and in another Lateran council, held under Innocent III., there were very strict canons made against pluralities; by the first of these councils pluralities are restrained, and every person admitted *ad ecclesiam, vel ecclesiasticum ministerium*, is bound to reside there, and personally serve the cure; by the second of these councils, if any person, having one benefice with cure of souls, accepts of a second, his first is declared void *ipso jure*. These canons were received in England, and are still part of our ecclesiastical law.

At the first appearance of these canons, there was no doubt made but they obliged all *rectors*; for they, according to the language of the law, had churches *in title*, and had *beneficium ecclesiasticum*: and of such the canons spoke. But *vicars* did not then look upon themselves to be bound by these canons, for they, as the gloss upon the decretals speaks, had not *ecclesiam quoad titulum*; and the text of the law describes them, not as *having benefices*, but as bound *personis et ecclesiis deservire*, that is, as assistant to the rector in his church.

Upon this notion a practice was founded, and prevailed in England, which eluded the canons made against pluralities. A man beneficed in one church could not accept another, without avoiding the first; but a man possessed of a benefice, could accept a vicarage under the rector in another church, for that was no benefice in law, and therefore not within the letter of the canon, which forbids any man holding two benefices.

The way then of taking a second living in fraud of the canon was this: a friend was presented, who took the institution, and had the church *quoad titulum*; as soon as he was possessed, he constituted the person vicar for whose benefit he took the living, and by consent of the diocesan, allotted the whole profit of the living for the vicar's portion, except a small matter reserved to himself.

This vicar went and resided upon his first living, for the canon reached him where he had the *benefice*; but having no benefice where he had only a vicarage, he thought himself secure against the said canons requiring residence.

This piece of management gave occasion to several papal decrees, and to the following constitution of archbishop Langton; *viz.* No ordinary shall admit any one to a vicarage, who will not personally officiate there. Lind. 64.

And to another constitution of the same archbishop, by which it is enjoined, that vicars who will be non-resident shall be deprived. Lind. 131.

But the abuse still continued, and therefore Otho, in his legatine constitutions, applied a stronger remedy, ordaining, That none shall be admitted to a vicarage, but who, renouncing all other benefices (if he hath any) with cure of souls, shall swear that he will make residence there, and shall constantly so reside: otherwise his institution shall be null, and the vicarage shall be given to another. Athon. 24.

And it is upon the authority of this constitution that the oath of residence is administered to vicars to this day. And this obligation of vicars to residence was further enforced by a constitution of Othobon, as followeth: If any shall detain a vicarage contrary to the aforesaid constitution of Otho, he shall not appropriate to himself the profits thereof, but shall restore the same; one moiety whereof shall be applied to the use of that church, and the other moiety shall be distributed half to the poor of the parish, and half to the archdeacon. And the archdeacon shall make diligent inquiry every year, and cause this constitution to be strictly observed. And if he shall find that any one detaineth a vicarage contrary to the premises, he shall forthwith notify to the ordinary that such vicarage is vacant, who shall do what to him belongeth in the premises; and if the ordinary shall delay to institute another into such vicarage, he shall be suspended from collation, institution, or presentation to any benefices until he shall comply. And if any one shall strive to detain a vicarage contrary to the premises, and persist in his obliquity for a month; he shall, besides the penalties aforesaid, be *ipso facto* deprived of his other benefices (if he have any); and shall be disabled for ever to hold such vicarage, which he hath so vexatiously detained, and from obtaining any other benefice for three years. And if the archdeacon shall be remiss in the premises, he shall be deprived of the share of the aforesaid penalty assigned to him, and be suspended from the entrance of the church, until he shall perform his duty. Athon. 95.

So that, upon the whole, the doubt was not, whether rectors were obliged to residence; the only question was, whether vicars were also obliged: and to enforce the residence

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dence of vicars, in like manner as of rectors, the aforesaid constitutions were ordained. Sherl. *ibid.* p. 20, 21, 22.

By the 43 Geo. III. c. 84. no oath shall be required of or taken by any vicar in relation to residence on his vicarage. f. 37.

Can. 47. Every beneficed man licensed by the laws of this realm, upon urgent occasions of other service, not to reside upon his benefice, shall cause his cure to be supplied by a curate that is a sufficient and licensed preacher, if the worth of the benefice will bear it. But whosoever hath two benefices, shall maintain a preacher licensed in the benefice where he doth not reside, except he preach himself at both of them usually.

And by the last article of archbishop Wake's directions it is required, that the bishop shall take care, as much as possible, that whosoever is admitted to serve any cure, do reside in the parish where he is to serve; especially in livings that are able to support a resident cure: and where that cannot be done, that they do at least reside so near to the place, that they may conveniently perform all their duties, both in the church and parish.

By the 36 Geo. III. c. 83. the ordinary, besides appointing to curates an allowance not exceeding 75*l.* per ann. may, on livings where the rector or vicar does not personally reside four months in the year at least, grant the use of the rectory or vicarage house, and the garden and stable thereto belonging, such use to be granted to the said curate for the space of twelve calendar months by the authority of the ordinary, under his hand and seal, with power in the said ordinary to renew and grant from time to time, or a further sum, not exceeding 75*l.* per ann. in lieu of such house, garden, and stable, in case there shall be none such, or it shall appear to him not to be convenient to allot and assign the same to such curate. Provided that the said house, garden, and stable, shall be for the use of the said curate and his family only during his *actual* residence in the said rectory and vicarage house. Provided also, that the ordinary shall have power at any time under his hand and seal, to revoke the grant to the said curate of the said house, garden, and stable, or any of them, and also to insert in such grant such terms and conditions to be observed on the part of the curate as he shall think reasonable.

By the faculty of dispensation, a pluralist is required, in that benefice from which he shall happen to be most absent, to preach thirteen sermons every year; and to exercise hospitality for two months yearly, and for that time, according to the fruits and profits thereof, as much as in him lieth, to support and relieve the inhabitants of that parish, especially the poor and needy.

By the 1 W. c. 26. if any person presented or nominated by either of the universities to a popish benefice with cure, shall be absent from the same above the space of sixty days in any one year; in such case, the said benefice shall become void. Burn's *Eccl. Law*, art. *Residence*.

RESIDENCE, in *Chemistry*, &c. the *settling*, or what remains of a liquor, or other substance, in the vessel after the chief part of it has been poured or taken out, to change the manner of the operation on what is left.

RESIDENCE, *Country*, in *Ornamental Gardening*, a rural habitation, mansion, or other kind of place, where it, as well as the ground which surrounds it, are formed and laid out in some sort of ornamental style. There have been a great many ways of accomplishing this proposed at different times, which have given rise to the variety of styles that have prevailed at different periods; but the *avowedly formal*, and the *affectedly graceful*, are the two which have been chiefly had recourse to, according to the writer of the

"*Treatise on Country Residences*," before that of the free, characteristic, natural one, which he has suggested the introduction of; which is confined to no particular style or mode, but which furnishes and supplies beauties and effects which are suitable to the scene and situation, whatever the age or country may be from which they are borrowed, or by whatever epithets they may be called or known.

Suppose a piece of ground containing from four to five hundred acres, of which more than three hundred are to be formed into a residence; that a brook may pass through it, partly among meadows or wastes of copse and pasture, and partly along the hedge fences; that two farm-houses, some cottages, and belts of planting may likewise appear; that the farm-house in the centre is on the highest ground, which descends in varied and gentle slopes on every side to the margin of the brook, except toward a cluster of cottages upon the banks of it, where it abruptly terminates in a wooded precipice of rocks or gravel, or something of a similar kind.

The manner of forming a residence, in such a situation, according to the ancient formal style of a century ago, would, in the first place, have been to clear away every cottage, hedge, and tree; then to level down the precipice, and all irregularities. After which to form it into square fields and avenues, planting belts of trees between them. Two small woods would have been placed on each side of the house, and a large one near the garden. The water of the brook would have been introduced through a conduit, to an oblong canal; from that to two round basins in the central garden; thence to another oblong canal answering to the first. From that, under ground, as before, to two ponds in the large wood; after which to be carried by the side of the outer strip of plantation until it rejoined the former canal. The other parts are not very material. But it may be noticed that the surrounding fields would have nothing done to them, but the removal of the cottages, and the belt of planting, which would otherwise have closed the view from the avenue. The short avenues would probably be continued through the fields in single rows of trees.

And according to the affectedly graceful, or more modern style of Brown and his followers, the same portion of land would have been laid out by means of clearing, levelling, and smoothing the irregularities of the surface in the first instance, only leaving a single small cottage properly hidden by the belt of planting. The house would be built on the highest part of the ground. The whole of the offices sunk under or below it, with the exception of the stables; and the part of the house which is seen, in the form of a cube, with a large front, visible only on the side on which is the approach. The brook elevated upon the side of the rising ground, and formed into a still river, with cascades and islands, which are capable of being seen all round from the house. The park surrounded with a belt, inclosing a ride or drive within this, the whole diversified with clumps of various sizes, but mostly similar in shape. The park fed with deer, sheep, and cattle, and the more considerable spaces in the drive, with the whole of the pleasure ground, regularly mown. Buildings would be introduced in various places in the drives as well as the park. The approach and walks formed in different turns and windings, and the pleasure ground, and kitchen garden, in a regular manner, the latter mostly in the perfectly square form. From each of the drives, the approach, walks, and the pleasure ground, the objects of view are either the ornamental buildings or the mansion, vistas being made in all places from the one to the other; the belt excludes the whole of the distant country from the lower parts of the ground, and the clumps from the

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the higher, as well as from the house. It may be supposed that nothing would be done to the surrounding country, only, perhaps, that in the place of the removed cottages, a formal street, under the title of improved village, might be formed and raised at a suitable distance from the mansion and its approach. It is suggested that numbers of places in this country, as well as in Scotland, are laid out nearly in this manner; and that the general pastures, the *belt*, the *clump*, the *tame* and *still* river, abound in both countries, and continue to be formed in the same way, whatever may be the natural character of the situation or place.

But according to the characteristic or natural manner which the writer has advised, such a situation should be laid out somewhat in this way. The house should be placed on the abrupt termination of the rising grounds, the whole of the offices be brought more or less into view, each of such buildings being made low, irregular, and suitable to the nature of the ground. The brook be rendered more characteristic as such, by having little aits and islands formed in it, as well as occasional pools, or stagnated spots of water, in the open parts, and under the shade of the grove where not seen. Near the house, in the hollow, it should spread out in the manner of a lake, being varied by prominences, islands, and wood. The stable offices, kitchen garden, and farm, should be placed near each other, and at no great distance from the main residence. The wood should be seen in one extensive irregular mass, crowning the large eminence, and connecting it with the lower grounds in which the brook runs. Instead of surrounding the whole with a belt of planting, the borders of the park should every where blend in an irregular manner with the country; in some places a hedge only, in others a sunk fence, and in a few open palings should separate it from the corn-fields; in different places large portions of it may be united to the country by means of hurdle fences, in which way more or less of it may be inclosed and let out to tenantry as thought proper. In this mode, the wood does not terminate abruptly with the park; but gradually loses itself in scattered trees, hedge-rows, and occasional strips among the corn lands of the neighbouring farms. Hence, it is suggested, arise the beauty of the views in walking round the outside border of the park. An irregular village should be formed by scattered cottages, wood, and pasture, from which the approach is led to the house; with a branch to the offices and the garden; the farm road is mostly concealed, but might often be partially seen with advantage. Walks should be formed in different parts of the grounds; those for morning and evening should be extensive and open; those for noon wholly under the wood. They both afford considerable variety, whether the beauty and wildness of the park, the views of the distant corn-fields and hedge-rows, the village, the brook, or the different picturesque compositions formed by the house and offices be regarded; without saying any thing concerning distant prospect, which, in the other practice, is often lost by the belt, and at all events constantly prevented from harmonizing with the park, by its dark distant boundary. The cattle may be guarded and kept off from the front of the mansion by some proper sort of fence, and a certain space along the border and rivulet be preserved as pleasure ground, in which exotic shrubs and flowers may be planted in dispersed natural-like groups and thickets. The whole of the other parts of the ground may be fed with cattle, horses, deer, and sheep, as well as other animals. The kitchen garden, in such a situation, need not be so large as in other cases, as many culinary vegetables may be grown in other places, and the fields of the farm. Nor will an orchard be necessary in many cases, as a sufficient number of

fruit-trees may be introduced in the groups, and pleasure-ground scenery. There may, besides these, be some other differences made, which need not be noticed in this place. A drive may be made through the park as thought proper, and through the surrounding country according to the circumstances of it as connected with the park. The planting in the park should abound with low growths and wildnesses, in the nature of the trees and the various masses of wood in it.

The same spot of ground is displayed as formed and laid out after these three different methods, in the work already alluded to, which may be consulted with much advantage by the inquirer on this head.

In comparing the leading distinctions between the two latter of the above methods of forming and laying out rural residences, or that followed by Brown, Repton, and others, and that which has been suggested by the writer; it is remarked that, in relation to the *whole*, the object of the *former* is to render a residence separate from the country; while the *latter*, or the characteristic style of forming, and the improvements proposed in residences already formed on bad principles, tend to harmonize it. In relation to the parts, that sort of gardening forms and places every thing distinctly and alone; while this groups and connects them with each other, and with the whole.

In what regards *wood*, the vulgar practice is, it is said, to shut out the country by a belt, and to vary the space within by the clumps: while that which is proposed tends to increase the expression and character of the situation or place, whatever part of the grounds it may direct to be wooded, whether in the middle or the boundaries; and instead of shutting out the country, the wood diverges in a gradual manner into hedge-rows, so as to unite and harmonize it as much as possible with the residence.

In respect to *buildings*, the former or common way is to conceal every thing except the mansion: while this, on the contrary, shews every building, not as single objects, but as compound parts of the scenery of the place.

In relation to *water*, the old or former plan is to produce quantity or extent of surface, and to render it as conspicuous as possible: while the style here proposed is to produce natural character.

In respect to *ground*, the former or modern system is to smooth and form undulating surfaces: while that of this is to attend to natural character.

In what regards *parks*, modern landscape gardening, it is said, makes them smooth and destitute of under-growths, ferns, and other plants: while this, by introducing hollies, thorns, briars, ferns, and sometimes furze, broom, and brambles, gives them a wild forest character, which is the great and main object of their formation and arrangement.

In respect to *pleasure-ground*, the common mode, it is said, is to form many acres of lawn, which are to be kept in preservation at a great expence, while they produce nothing. The plan here proposed admits of more or less, according to circumstances and situation, but generally forms little that is not grazed by sheep or covered by flowers, extensive mowing being therefore never requisite, and it commonly permits the cattle to come within a small distance of the residence.

The difference of expence will, it is supposed, be very considerable, as must be evident from the general consideration of the difference between assisting what Nature has already begun, and counteracting her altogether. This will be so whether it relates to the mansions, buildings, planting, water, gardens, farms, or pleasure-grounds. And there will be differences

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differences of a minor nature on all these heads, as well as on many others.

The ideas respecting the latter of these methods of forming and laying out residences of this nature, have yet been but little put in practice, nor their union in the mind of any one person been such as to produce a distinct style in regard to them, except, perhaps, with the writer of the work before alluded to. They are, however, of considerable importance, and highly deserving of attention, not only as being founded on the principles of nature, but as according so well with the nature of rural scenery.

In chusing situations for residences of this description, it is advised, that attention should be particularly paid to such as are most convenient in what respects site and position, as they relate to the adjoining country; that they should be the most striking which the grounds will afford; and that they should furnish the best views from the residences of the surrounding country which it is capable of supplying.

A perfect knowledge of what is deficient, and whether that which is wanted can be supplied by the proposed site, or is wholly wanting, or some others deficient that cannot readily be afforded, will greatly contribute to the decision of the first point. And much assistance, in some respects, may often be derived from the neighbouring residences, especially as to climate, weather, springs, rivulets, roads, markets, and many other similar particulars; though they can mostly be ascertained with little trouble in other ways.

In regard to the next point, it is of very great importance, as the effect depends much upon it. Where the surfaces are only gently varied, some of the highest eminences may be mostly fixed upon for this purpose. But where they are varied in a high degree, and where a number of hills are within the proposed space: if such hills slope gently, some of their sides may commonly be selected for this use; or, when they are very steep, it may be upon some gentle rising or eminence near their bottom parts. Occasionally, where rivers pass through the grounds, it may be on some of their banks, where they are rendered interesting either by rocks, bends, or other similar means. Where there are lakes, the margins of them may be proper for the purpose, as producing good effects in such cases; and the rocky margins of the sea, in some instances, may be very suitable. Many other appropriate situations for this purpose might be noticed, but these may shew the nature of striking ones, and the means of selecting them.

The proper accomplishment of this object is very material, as any error in it may be highly injurious in various ways; while its being properly done saves expence, and at the same time affords a far superior effect, as is seen in a variety of instances.

In respect to the last matter, or that of the views towards the surrounding scenery being agreeable, it is supposed to be the best accomplished by the proper arrangement or disposition of the apartments of a residence. Where regularity is to prevail this cannot always be so easily done, but where the irregular is had recourse to, which should mostly be the case in this sort of residence, there can be little difficulty in effecting it, either by means of projections or recesses.

Thus, the breakfasting room should front a morning scene, and afford a prospect somewhat inviting to exercise throughout the day; the drawing room should have such a disposition as to display the effects of the setting sun, &c. In short, to every view, some object, it is supposed, should appear sufficiently striking to characterise it; as a hill, a spire, or some other thing of a similar nature; as, unless this be the case, too trifling an impression is left upon the mind. All

these matters, it is supposed, are the best decided upon the particular spots where they should be marked out and left for the observations of others, with the view of their being afterwards finally settled. They should never be determined upon in the closet of the designer.

In forming residences of this nature, the style of the buildings should, in some measure, it is thought, be adapted to, or regulated by, the nature of the place, and the general growth of the trees in it; the forms of the particular trees which may be peculiar to it; the general character of the surrounding scenery; and the colour of the rocks, as well as of the ground. It is found that the more common sorts of trees, in their natural growth, whether single or in groups, deviate a little in their general form, and the delicacy of their parts, according as their situation may be. Thus, where much exposed, they are mostly broad and low, being more hardy, rough, and picturesque, than when covered with young shoots, which are comparatively soft, fresh, and beautiful. In high rocky spots and exposures, trees are much broken, or divided into parts, and distant from each other, but apparently firmly attached to the place; these are hardier than others, with much less softness and beauty. In low fertile plains, trees are mostly large and erect, throwing out their branches on all sides; the foliage is full and fresh; and the whole outline round, full, and flowing. When single in this sort of situation, the balance of the branches in the trees is better preserved, than in the contrary cases. Where vallies are confined between hills, trees grow high and upright, rarely broad, or putting forth many horizontal branches: the growth is quick; the shoots and foliage are tender and delicate; the trunk comparatively slender; and the whole trees more elegant and capable of graceful motions than in any of the former situations or aspects.

It is supposed that these different circumstances in the growth of trees may easily suggest styles of building somewhat analogous in their general magnitude, height, and finishing. On rocky exposed spots, where trees grow low and irregular; low irregular edifices in the castle style may be raised. In vallies, where they grow high and elegant, houses in the tower style, which implies much height, should commonly be had recourse to. In rich extended plains, buildings of the Grecian order, or such as are in a more massy and regular style than the others, should be formed. "This mode is," it is said, "certainly deserving of attention, were it for no other reason than that the trees might group well with the buildings; that when full grown they might neither be too large, nor too small; that they might neither diminish it into insignificance, nor leave it staring through trees, which, from want of due proportion to it, appear as copse-wood." Many instances of these different evils are to be met with in different places.

And it is noticed, that this mode of fixing on the style of residences of this kind must be attended to, though trees be not growing on the situations at the time of forming and raising them. This is to be determined in such cases, by the nature of the climate and the qualities of the soil, as the growth of trees chiefly depends upon them.

With regard to the forms of trees, most places are capable of affording common ones, such as oaks, elms, beeches, and others of similar kinds. But there are many spots, where residences of this sort may be formed, that are only capable of raising certain descriptions to the state of trees. This frequently occurs in hilly and maritime situations; which therefore require the particular attention of the designer; as the kinds of trees that suit them are so very different from the ordinary sort, that if he were to be attempting to group

with oaks and beeches, he might be grievously disappointed, as not any would probably grow, but spiry larches, dark Scotch firs, birches, and mountain ash, or perhaps only ivy and elder. This may furnish a variety of useful hints to the designer, as well as others.

The general character of the surrounding scenery is equally deserving of attention as the trees, and should concur in deciding on the style of the residence. It is a common notion that buildings should form strong contrasts to the works of nature, from which various styles of them have been suggested under different circumstances; but more full inquiry will shew that very sudden contrasts are not found in general nature, though they may accidentally occur in some cases, consequently that they are highly improper to be used in this way.

With respect to the colour of the rocks, and the ground, it is said, that, not merely the general forms of the surface, but the appearances of the soil and the rocks, should deserve attention, as contributing greatly to promote the principle of harmony. The tints of rocks, stones, gravel, and the soil, are mostly the same in one part of the country. Where they agree with the colour of the residence, the effect must, it is supposed, be singularly happy, as seen in the works of painters, as well as in the ancient residences of the country kind. But where they disagree, it must be disgusting, as is seen in many cases of white-washing buildings in rocky situations. This furnishes hints which may be useful in managing that process to the most advantage in other cases; and others are likewise thrown out upon different matters, which are equally useful. But the designer is cautioned against carrying these, or any other notions, into the extreme, contrary to the common practice; as where the expression of gaiety, or striking beauty, is desirable, no reasons suggested from the colour of the rocks or soil are intended to hinder the production of these characters, if in general harmony with what surrounds them.

There are many other matters which relate to the subject, that are forcibly pointed out, and the means of executing them well explained, in the work alluded to above, such as the methods of uniting residences of this sort with the grounds by means of the offices and appendages of other kinds; and with the surrounding country or scenery by the former, as well as by architectural appendages principally of the ornamental description. Also as to the modes of executing and finishing them.

More full information on the whole of this subject may be obtained from the above treatise, and the writings of Knight, Price, and others on the same head.

RESIDENT, a public minister, who manages the affairs of a king in the court of a prince, or petty state; or the affairs of a prince, or petty state, in the court of a king or prince.

Thus, the king of England has residents in the courts of the electors, and other princes of Germany and Italy; at the republics of Genoa and Lucca; and they, reciprocally, have residents in the court of Great Britain.

Residents are a class of public ministers inferior to ambassadors and envoys; but, like them, they are under the protection of the law of nations.

The resident does not represent the prince's person in his dignity, but only in his affairs. His representation is in reality of the same nature as that of the envoy; and he is accordingly, together with the envoy, often termed a minister of the second order; and thus the public ministers are distinguished only into two classes; ambassadors, who have the representative character, so termed by way of

excellence, and all the ministers who are not invested with that eminent character.

RESIDENT, *Residens*, in our *Ancient Customs*, was a tenant who was obliged to reside on his lord's land, and not to depart from the same, called also *homme levant and couchant*, and in Normandy *ressant du fief*.

“Quantumque de aliis teneat, ei magis obnoxius est; & ejus residens esse debet, ejus legius est.” Leg. H. I.

RESIDENTIARY, RESIDENTIARIUS, a canon installed to the privileges and profits of residence.

RESIDUAL ANALYSIS, is a branch of algebra invented by Landen, and applied to the solution of those problems usually solved by means of the differential and integral calculus, or the direct and inverse method of fluxions; by which the ingenious author thought to be able to avoid the objections generally made to the new calculus under either of the above forms. With regard to the fluxional process, he thought it more free from objection than the differential calculus; although many important ones might be discovered in it. However natural, says the author, it may be, in certain problems, to consider such magnitudes as enter therein, to be generated by motion, it seems very unnatural to bring motion into consideration in the solution of questions purely algebraical. Nor does it seem natural in the solution of problems concerning the motion of bodies, to superinduce imaginary motions, and thereby bring into consideration the velocity of time, the velocity of velocity, &c.; nor yet does it appear more natural, in the resolution of other problems, to make use of the fluxionary method, when (as is most commonly the case in that doctrine) the fluxions introduced into the process can, only in a figurative sense, be said to be the velocities of increase of the quantities called their fluents; such figurative expressions not being the natural language of analytics, but frequently, instead of conveying clear and distinct ideas, are confusedly employed in treating of quantities as generated by motion, which in reality cannot be conceived to be so generated. That these are legal objections to the doctrine of fluxions we are not disposed to deny; but it is now generally admitted, that the defect of the fluxionary calculus is by far less than that which has place in the residual analysis, which M. Landen was desirous of substituting for it. Indeed, we believe its defects were so obvious, that few, if any, mathematicians were induced to make it the foundation of any of their investigations; and it would, therefore, be useless for us to occupy our pages in explaining the principles on which the author rested his calculus. We shall, therefore, merely observe, that in this analysis, a geometrical or physical problem is reduced to another purely algebraical; and the solution is then obtained without any supposition of motion, and without considering quantities as composed of infinitely small particles.

Instead of finding the fluxion of a variable quantity, in the residual analysis, the author proceeds by taking the difference of the same function of the variable, in two different states of that quantity, and expressing the relation of this difference to the difference between the two states of the variable quantity itself. This relation, being first expressed generally, is then considered in the case in which the difference of the two states of the variable quantity is equal to zero.

Thus when, in the fluxionary calculus, it would be necessary to find the fluxion of such a quantity v^r , which is

$$\frac{m}{r} v^{m-r} \cdot v, \text{ M. Landen takes the quotient of } \frac{v^m - \omega^m}{v^r - \omega^r},$$

D

when

when $v = w$, and finds it to be $\frac{m}{r} \frac{m-r}{v}$, as above; and in the same manner he determines what is commonly called the fluxions of a^x , x^x , $\log. x$, &c.

The first book of the residual analysis was published in 1764, which contains its application to a variety of algebraical inquiries, and in determining the tangents, evolutes, ordinates, points of contrary flexure, double and triple points, &c. And in the second book it was intended to shew its application in a variety of mechanical and physico-geometrical inquiries; but, for some reason not known, that book was never published.

RESIDUAL Figure, in *Geometry*, the figure remaining after subtraction of a lesser from a greater.

RESIDUAL Root, is a root composed of two parts or members, only connected together with the sign $-$.

Thus, $a - b$, or $5 - 3$, is a residual root; and is so called, because its true value is no more than its residue, or difference between the parts a and b , or 5 and 3 .

RESIDUARY LEGATEE. See **LEGATEE**.

RESIDUE, **RESIDUUM**, the remainder or reliqua of an account, debt, or obligation.

RESIDUUM of a Charge, in *Electricity*, first discovered by Mr. Galath, in Germany, in 1746, is that part of the charge that lay on the uncoated part of a Leyden phial, which doth not let go all its electricity at once; so that it is afterwards gradually diffused to the coating.

RESIDUUM of an Intestate's Effects. See **INTESTATE**. See also **EXECUTOR**, and **Residuary LEGATEE**.

RESIGNATION, in *Ethics*, is a moral virtue, which superadds to patience a submissive disposition, respecting the intelligent cause of our uneasiness. It acknowledges both the power and the right of a superior to afflict: it is usually connected with a confidence in his justice, and indulges a hope also in some future exemption, and thus it opposes a fretful repining temper of mind.

RESIGNATION, *Resignatio*, in the *Canon Law*, the surrender or giving up of a benefice into the hands of those from whom it was received.

Resignation is of equal import with *surrender*; only the former is restrained to spiritual benefices, and the latter to temporal offices or employments.

It is a maxim in the ecclesiastical law, that all resignations must be made to some superior (*Gibf. 822.*); therefore a bishop must resign, not to the dean and chapter, but to his metropolitan, from whom he received confirmation and consecration; but the archbishop can resign to none but the king himself.

Resignation must be made to the next immediate superior, and not to the mediate; as of a church presentative to the bishop, and not to the metropolitan. (*2 Roll. Abr. 358.*) Donatives are not resignable to the ordinary, but to the patron who hath power to admit; and if there be two patrons of a donative, and the incumbent resign to one of them, it is good for the whole. Regularly, resignation must be made in person, and not by proxy. It is usually done either by personal appearance before the ordinary, or elsewhere before a public notary, by an instrument directed immediately to the ordinary, and attested by the said notary, in order to be presented to the ordinary by a proper person, who may pray his acceptance. No resignation can be valid, till accepted by the proper ordinary; that is, no person appointed to a cure of souls can quit that cure, or discharge himself of it, but upon good motives, to be approved by the superior who committed it to him; for it may be, that he would quit it for money, or to live idly, or the like. Nor is there any pretence to say, that the ordinary is

obliged to accept; since the law hath appointed no known remedy if he will not accept, any more than he will not ordain. *1 Still. 334.*

Lindwood makes a distinction in this case, between a cure of souls, and a sine-cure. The resignation of a sine-cure, he thinks, is good immediately, without the superior's consent; because none but he that resigneth hath interest in that case: but where there is a cure of souls, it is otherwise, because not he only hath interest, but others also unto whom he is bound to preach the word of God; wherefore, in this case, it is necessary that there be the ratification of the bishop, or of such other person as hath power by right or custom to admit such resignation. (*Gibf. 823.*) After acceptance of the resignation, lapse shall not run but from the time of notice given. The church, indeed, is void immediately upon acceptance, and the patron may present, if he please; but as to lapse, the general rule that is here laid down is the general doctrine of all the books: insomuch that if the bishop, who accepted the resignation, dies before notice given, the six months shall not commence till notice is given by the guardian of the spiritualities, or by the succeeding bishop, with whom the act of resignation is presumed to remain. *Gibf. 283.*

Resignations are either *simple* or *conditional*.

RESIGNATIONS, Simple or Pure, are those by which the incumbent strips himself of all his right, absolutely, and without any conditions, or reserve of pension. These are made to the bishop, or ordinary.

By the *31 Eliz. cap. 6. § 8.* if any incumbent of any benefice, with cure of souls, shall corruptly resign the same, or corruptly take for, or in respect of resigning the same directly or indirectly, any pension, sum of money, or other benefit whatsoever; as well the giver, as the taker, shall lose double the value of the sum given or received; half to the queen, and half to him that shall sue for the same. Before the statute, the bishop, in cases of resignation, might, and did frequently, assign a pension, during life, out of the benefice resigned, to the person resigning. But by the aforesaid act, no pensions whatsoever can be reserved. But a man may bind himself by bond to resign, and it is not unlawful. For bonds of resignation, see **SIMONY**.

RESIGNATIONS in Favour, or Conditional Resignations, are such as are only made on condition that such other persons should be invested with them; so that the resignations are null, unless the conditions be punctually executed. These resignations *in favorem* are not of above two hundred and fifty years standing. Strong opposition was at first made to them, they being esteemed a kind of succession or transmission of benefices, as of patrimonies belonging to a family. Accordingly, these resignations are not made into the hands of the ordinary, or collator, as pure resignations are, but to the collator paramount, who in the Romish church is the pope; there being a suspicion of simony or other unlawful paction therein, where admitted of in prejudice to the lay patron.

RESIGNEE, in *Law*, the party to whom a thing is resigned.

RESINS, in *Chemistry* and the *Arts*, peculiar inflammable compounds, furnished by some vegetables, and in some cases by animals.

Agreeably to what we have observed under **OILS**, all bodies coming under the head of the latter, although perfect liquids in their ordinary state, are susceptible of a solid form, by long exposure to the air, and more speedily by exposure to bodies furnishing oxygen with facility. Those oils we term fat oils, such as olive, spermaceti, rape, &c. by treating with nitric acid, become solid like tallow, and possess

possess similar properties. The oils termed *drying*, such as linseed and nut-oil, by the presence of oxygen, assume a solid form, unlike the greasy substance afforded by the fat oils, and more like horn, or elastic gum (caoutchouc.) The volatile oils are susceptible of the same change, from liquidity to solidity, by the agency of oxygen; the result being resins, which differ from each other in nothing material, excepting their degrees of solidity, and their peculiar odour. If we are to conclude that every essential or volatile oil is capable of being converted into a resin, which is highly probable, the number of resins will be very great. Indeed the known species are vastly too numerous for our notice in this place: we shall, therefore, confine our attention to a few of the most particular resins, especially those which are valuable in the arts, and in medicine. Dr. Thomson gives the following list of resins, with the names of the vegetables from which they are obtained.

1. Turpentine of Chio, from the pistacia terebinthus.
 2. Venice turpentine.
 3. Strasburgh turpentine, from the common fir.
 4. Pitch, from the pinus picea.
 5. Elemi, from the amyris elemifera.
 6. Mastic, from the pistacia lentifusca.
 7. Sandarach, from the juniper.
 8. Guaiac, from the guaiacum officinale.
 9. Laudanum, from the cistus ladaniferus.
 10. Dragon's blood, from the dracæna draco.
 11. Balsam of Mecca, from the amyris opobalsamum.
 12. Balsam of Copahu, from the copaifera officinalis.
- To these may be added,

13. Balsam of Canada, from the pinus balsamea.
14. Guaiacum, from the lignum vite.
15. Copal, from the copallinum of North America.

Some of the resins are combined with benzoic acid, by which their properties are altered: of these are benzoin, balsam of Tolu, balsam of Peru, and storax.

Another class of these bodies are combined with gum, and hence have been called *gum resins*: of these are olibanum, galbanum, scammony, assafoetida, myrrh, ammoniac, aloes, and opium. They admit of analysis, either by separating the resinous part by alcohol, or the gummy part by water.

These latter substances are used in medicine. Some of the first class, or the pure resins, are used as cements; and their solution in alcohol constitutes a variety of useful varnishes.

Those resins which are distinguished by the name of balsams are said to be such as contain benzoic acid. It appears, however, they have also been distinguished for their liquidity, and from their excess of odour; so that at present the phrase appears to be very indefinite. See BALSAM.

The resins are of various degrees of consistence and hardness. The balsams of Canada and Mecca are thickish fluids: the former is often so liquid as to be spread with a brush, and is sometimes used for varnishing pictures. It gradually hardens, on exposure to the air, and ultimately may be rubbed with the hand without soiling.

Others of the resins become hard with very little exposure to the air, and are found in hard tears, sticking to the tree which affords it: of these are mastic, sandarach, and copal. Those which do not easily become solid may be obtained in that form, by distilling off the thin part. Resin and pitch are obtained in this way: the former is obtained by distilling turpentine, the latter by distilling tar. Tar is no other than turpentine contaminated with the foot, which is produced by the partial combustion employed for its extraction from the wood.

All the resins become harder by exposure to a moderate heat. It is upon this fact that the art of the japanner depends. If the surface to be japanned be covered with common tar only, and exposed to the temperature of 300° for a length of time, the coating becomes hard and infusible. At the same temperature, any other resin applied in the same way, would assume a similar hardness.

Some animals and minerals, as well as the vegetables, afford resins, or bodies very analogous to them. The concrete part of the bile of animals has most of the properties of a resin, and shell-lac is furnished from the insect called *coccus lacca*.

Ear-wax is also found to have the properties of a resin; and the substances well known as perfumes, castor, civet, and musk, are no other than animal resins. For the particular application of resins to *varnishing* and *japanning*, see those articles.

Resins are employed for many purposes. Those of the cheapest kind are used for torches, and to cover the outsidings of ships and boats. The fine transparent resins compose varnishes. Many of them are employed medicinally: such are those which enter into the composition of ointments and plasters; or internally, as the resins of scammony, jalap, and turpeth, which are purgative. Other resins, the smell of which is agreeable, as benjamin and storax, are employed as perfumes.

RESIN, *Elastic*. See CAOUTCHOUC.

RESIN, *Mastic*. See MASTIC.

RESISTANCE, or RESISTING Force, in *Physics*, any power which acts in opposition to another, so as to destroy or diminish its effect.

Of resistance there are various kinds, arising from the various natures and properties of the resisting bodies, and governed by various laws: as the resistance of solids, the resistance of fluids, the resistance of the air, &c.

RESISTANCE of Solids, in *Mechanics*, is the force with which the quiescent parts of solid bodies oppose the motion of others contiguous to them.

Of this there are two kinds. The first, where the resisting, and the resisted parts, *i. e.* the moving and quiescent bodies, are only contiguous, and do not cohere; *i. e.* where they constitute separate bodies or masses.

This is what M. Leibnitz calls *resistance of the surface*; but which is now more commonly denominated friction; for the laws of which, see FRICTION.

The second case of resistance is where the resisting and resisted parts are not only contiguous, but cohere; *i. e.* are parts of the same continued body or mass; for the phenomena and laws of which, see COHESION.

To which we may also add, the resistance which takes place between surfaces of solids, when completely in contact, though not forming one and the same body, or the resistance they offer to separation, the particulars of which are treated of under the article ADHESION.

RESISTANCE of the Fibres of solid Bodies, *Theory of the*. To form an idea of this resistance or tenacity of the parts, suppose a cylindrical body suspended vertically by one end. Here all its parts, being heavy, tend downwards, and endeavour to separate the two contiguous planes, where the body is the weakest; but all the parts resist this separation by the force with which they cohere, or are bound together. Here then are two opposite powers; *viz.* the weight of the cylinder, which tends to break it; and the force of cohesion of the parts, which resists the fracture.

If the base of the cylinder be increased without increasing its length, it is evident the resistance will be increased in the same ratio as the base; but the weight also increases in the same ratio: whence it is evident, that all cylinders of the

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same matter and length, whatever their bases may be, have an equal resistance, when vertically suspended.

But if the length of the cylinder be increased, without increasing its base, its weight is increased, while the resistance or strength remains the same: consequently it is weakened by its additional length, and has a greater tendency to break.

Hence, to find the greatest length a cylinder of any matter may have, to break with its own weight; it is only necessary to know what weight is just sufficient to break another cylinder of the same base and matter: for the length of the required cylinder must be such, that its weight may be equal to the weight of the first cylinder, together with the additional weight that was employed in producing the separation.

Thus let l denote the first length of the cylinder, c its weight, g the given weight the lengthened cylinder is to bear, and w the least weight that breaks the cylinder l ,

also x the length sought: then as $l : x :: c : \frac{cx}{l}$ = the weight of the longest cylinder; and this, together with the given weight g , must be equal to $c + w$: hence

then, $\frac{cx}{l} + g = c + w$; or $x = \frac{c + w - g}{c} l =$ the

length sought. When the cylinder is just to break with its own weight only, then $g = 0$, and the expression is simply

$$x = \frac{c + w}{c} l.$$

If one end of the cylinder were fixed horizontally into a wall, and the rest suspended thence, its weight and resistance would then act in a different manner; and if it be broke by the action of its weight, the rupture would be at the end fixed into the wall. A circle or plane contiguous to the wall, and parallel to the base, and consequently vertical, would be detached from the contiguous circle within the plane of the wall, and would descend. All the motion is performed on the lowest extremity of the diameter, which remains immovable, while the upper extremity describes a quadrant of a circle, and till the circle, which before was vertical, become horizontal; *i. e.* till the cylinder be entirely broken.

In the fracture of the cylinder it is visible two forces have acted, and the one has overcome the other: the weight of the cylinder, which arose from its whole mass, has overcome the resistance which arose from the largeness of the base; and as the centres of gravity are points in which all the forces, arising from the weights of the several parts of the same bodies, are conceived to be united, one may conceive the weight of the whole cylinder applied in the centre of gravity of its mass, *i. e.* in a point in the middle of its axis: and the resistance of the cylinder applied in the centre of gravity of its base, *i. e.* in the centre of the base; it being the base which resists the fracture.

When the cylinder breaks by its own weight, all the motion is on an immovable extremity of a diameter of the base. This extremity, therefore, is the fixed point of a lever, whose two arms are the radius of the base, and half the axis; and, of consequence, the two opposite forces do not only act of themselves, and by their absolute force, but also by the relative force they derive from their distance with regard to the fixed point of the lever.

Hence it evidently follows, that a cylinder, *e. gr.* of copper, which, vertically suspended, will not break by its own weight, if less than four hundred and eighty fathom long, will break with a less length in an horizontal situation; because the length, in this latter case, contributes

two ways to the fracture; both as it makes it of such a weight, and as it is an arm of a lever to which the weight is applied. Hence, also, the smaller the base is, the less length or weight will suffice to break it; both because the resistance is really less, and because it acts by a less arm of a lever.

Hence, to find the length a prism will bear, when fixed in an horizontal position, before it breaks, either by its own weight, or by the addition of any adventitious weight; take any length of such a prism, and load it with weights till it break; then put

l = the length of this prism,

c = its weight,

w = the weight that breaks it,

a = the distance of the weight w ,

g = any given weight to be borne,

d = its distance,

x = the length required to break it.

Then $l : x :: c : \frac{cx}{l}$, the weight of the prism x ; and

$\frac{cx}{l} \times \frac{1}{2} x = \frac{cx^2}{2l}$ = its momentum; also dg = the mo-

mentum of the weight g ; $\frac{cx^2}{2l} + dg$ = momentum of the prism x , and its additional weight g .

In like manner we have $\frac{1}{2} cl + aw$, for the momentum of the shorter prism, together with the weight w .

Consequently we obtain the following equation:

$$\frac{cx^2}{2l} + dg = \frac{1}{2} cl + aw;$$

from which is found $x = \sqrt{\frac{(aw + \frac{1}{2}cl - dg) 2l}{c}}$, the

length sought, or that by which the cylinder will break with the weight g , at the distance d . If this last weight be nothing, or the length be required when the cylinder would just break with its own weight, then we shall have $dg = 0$,

and the expression becomes simply $x = \sqrt{\frac{(aw + \frac{1}{2}cl) 2l}{c}}$.

If two cylinders of the same matter, having their bases and lengths in the same proportion, be suspended horizontally; it is evident, that the greater has more weight than the lesser, both on account of its length, and of its base. But it hath less resistance on account of its length, considered as a longer arm of a lever, and has only more resistance on account of its base; therefore it exceeds the lesser in its bulk and weight more than in resistance, and consequently it must break more easily.

Hence, we see why, upon making models and machines in small, people are apt to be mistaken as to the resistance and strength of certain horizontal pieces, when they come to execute their designs in large, by observing the same proportion as in the small. Galileo's doctrine of resistance, therefore, is no idle speculation, but becomes applicable in architecture, and other arts.

The weight required to break a body, placed horizontally, being always less than that required to break it in a vertical situation; and this weight being to be greater or less, according to the ratio of the two arms of the lever, the whole theory is always reducible to this: *viz.* to find what part of the absolute weight the relative weight is to be, supposing the figure of the body known; which indeed is necessary, because it is the figure that determines the two centres of gravity, or the two arms of the lever. For if the body,

e. gr.

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e. gr. were a cone, its centre of gravity would not be in the middle of its axis, as in the cylinder; and, if it were a semi-parabolical solid, neither would its centre of gravity be in the middle of its length or axis, nor the centre of gravity of its base in the middle of the axis of its base. But still, wheresoever these centres fall in the several figures, the two arms of the lever are estimated accordingly.

It may be here observed, that if the base, by which the body is fastened into the wall, be not circular, but, *e. gr.* parabolical, and the vertex of the parabola be at the top, the motion of the fracture will not be on an immoveable point, but on a whole immoveable line; which may be called the *axis of equilibrium*; and it is with regard to this that the distances of the centres of gravity are to be determined.

Now, a body horizontally suspended, being supposed such as that the smallest addition of weight would break it, there is an equilibrium between its positive and relative weight; and of consequence those two opposite powers are to each other reciprocally as the arms of the lever to which they are applied. On the other hand, the resistance of a body is always equal to the greatest weight which it will sustain in a vertical situation, without breaking, *i. e.* is equal to its absolute weight. Therefore, substituting the absolute weight for the resistance, it appears that the absolute weight of a body, suspended horizontally, is to its relative weight as the distance of its centre of gravity from the axis of equilibrium is to the distance of the centre of gravity of its base from the same axis.

The discovery of this important truth, at least an equivalent to it, and to which this is reducible, we owe to Galileo. From this fundamental proposition are easily deduced several consequences; as, for instance, that, if the distance of the centre of gravity of the base from the axis of equilibrium be half the distance of the centre of gravity of the body, the relative weight will only be half the absolute weight; and that a cylinder of copper, horizontally suspended, whose length is double the diameter, will break, provided it weigh half what a cylinder of the same base, 4801 fathoms long, weighs.

On this theory of resistance, which we owe to Galileo, M. Mariotte made a very ingenious remark, which gave birth to a new system. Galileo supposes, that, where the body breaks, all the fibres break at once; so that the body always resists with its whole absolute force, or with the whole force that all its fibres have in the place where it is to be broke. But M. Mariotte, finding that all bodies, even glass itself, bend before they break, shews that fibres are to be considered as so many little bent springs, which never exert their whole force till stretched to a certain point, and never break till entirely unbent. Hence, those nearest the axis of equilibrium, which is an immoveable line, are stretched less than those farther off; and, of consequence, employ a less part of their force.

This consideration only takes place in the horizontal situation of the body: in the vertical, the fibres of the base all break at once; so that the absolute weight of the body must exceed the united resistance of all its fibres; a greater weight is, therefore, required here than in the horizontal situation; that is, a greater weight is required to overcome their united resistance, than to overcome their several resistances one after another. The difference between the two situations arises hence, that, in the horizontal, there is an immoveable point or line, as a centre of motion, which is not in the vertical.

Varignon has improved on the system of M. Mariotte, and shewn, that, to Galileo's system, it adds the consideration of the centre of percussion. The comparison of the

centres of gravity with the centres of percussion afford a fine view, and set the whole doctrine in a most agreeable light.

In each system, the base, by which the body breaks, moves on the axis of equilibrium, which is an immoveable line in the same base; but in the second, the fibres of this base are continually stretching more and more, and that in the same ratio as they recede farther and farther from the axis of equilibrium; and, of consequence, are still exerting a greater and greater part of their whole force.

These unequal extensions, like all other forces, must have some common centre where they all meet, and with regard to which they make equal efforts on each side; and as they are precisely in the same proportion as the velocities which the several points of a rod moved circularly would have to one another, the centre of extension of the base, by which the body breaks, or tends to break, must be the same with its centre of percussion. Galileo's hypothesis, according to which the fibres are supposed to stretch equally, and break all at once, corresponds to the case of a rod moving parallel to itself, where the centre of extension or percussion does not appear, as being confounded with the centre of gravity.

The base of fracture being a surface, whose particular nature determines its centre of percussion, it is necessary that this should be first known, to find on what point of the vertical axis of that base it is placed, and how far it is from the axis of equilibrium. Indeed, we know in the general, that it always acts with so much the more advantage as it is farther from it; because it acts by a longer arm of a lever; and of consequence it is the unequal resistance of the fibres in M. Mariotte's hypothesis, which produces the centre of percussion; but this unequal resistance is greater or less, according as the centre of percussion is placed more or less high on the vertical axis of the base, in the different surfaces of the base of the fracture.

To express this unequal resistance, accompanied with all the variation it is capable of, regard must be had to the ratio between the distance of the centre of percussion from the axis of equilibrium, and the length of the vertical axis of the base. In which ratio, the first term, or the numerator, is always less than the second, or the denominator; so that the ratio is always a fraction less than unity; and the unequal resistance of the fibres in M. Mariotte's hypothesis is so much the greater, or, which amounts to the same, approaches so much nearer to the equal resistance in Galileo's hypothesis, as the two terms of the ratio are nearer to an equality.

Hence it follows, that the resistance of bodies in M. Mariotte's system is to that in Galileo's, as the least of the terms in the ratio is to the greatest. Hence, also, the resistance being less than what Galileo imagined, the relative weight must also be less; so that the proportion already mentioned between the absolute and relative weight cannot subsist in the new system, without an augmentation of the relative weight, or a diminution of the absolute weight; which diminution is had by multiplying the weight by the ratio, which is always less than unity. This done, we find that the absolute weight, multiplied by the ratio, is to the relative weight, as the distance of the centre of gravity of the body from the axis of equilibrium, is to the distance of the centre of gravity of the base of the fracture from the same axis: which is precisely the same thing with the general formula given by M. Varignon for the system of M. Mariotte. In effect, after conceiving the relative weight of a body, and its resistance equal to its absolute weight, as two contrary powers applied to the two arms of a lever, in the hypothesis of Galileo, there needs nothing to convert it

into

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into that of M. Mariotte, but to imagine that the resistance, or the absolute weight, is become less, every thing else remaining the same.

One of the most curious, and perhaps the most useful questions in this research, is to find what figure a body must have, that its resistance may be equal in all its parts, whether it be loaded with an additional weight, or as only sustaining its own weight.

To this end it is necessary that some part of it should be conceived to be cut off by a plane parallel to the fracture, so that the momentum of the part retrenched, be to its resistance in the same ratio as the momentum of the whole is to its resistance. These four powers act by arms of levers peculiar to themselves, and are proportional in the whole, and in each part, of a solid of equal resistance. From this proportion Varignon deduces two solids, which shall resist equally in all their parts, or be no more liable to break in one part than in another. Galileo had previously found one of these, which is that in which the sides are parabolical: the other, found by Varignon, is in the form of a trumpet, which is to be fixed into the wall by its greater end; so that its magnitude or weight is always diminished in proportion as its length, or the arm of the lever by which it acts, is increased. It is remarkable, that, however different the two systems may be, the solids of equal resistance are the same in both.

We cannot pursue the theory of resistances to a greater length in the present article; but shall confine ourselves to exhibiting a general synopsis of the most important results which have been drawn by different writers on this subject, both practical and theoretical.

1. The resistance of a beam, or bar, to a fracture, by a force acting laterally, is as the solid made by a section of the beam in the place where the force is applied, into the distance of its centre of gravity from the point or line where the breach will end.

2. In square beams, the lateral strengths are as the cubes of their breadths or depths.

3. In cylindrical beams, the resistances or strengths are as the cubes of the diameters.

4. In rectangular beams, the lateral strengths are conjointly as the breadths and squares of the depths.

5. The lateral resistances of any beams, whose sections are similar figures and alike placed, are as the cubes of the like dimensions of those figures.

6. The lateral strength of a beam, with its narrower face upwards, is to its strength with the broader face upwards, as the breadth of the broader face to the breadth of the narrower.

7. The lateral strengths of prismatic beams of the same materials, are as the areas of the sections, and the distance of their centre of gravity, directly, and as their lengths and weights reciprocally.

8. When the beam is fixed at both ends, the same property has place, except that, in this case, we must consider the beam as only half the length of the former.

9. Cylinders and square prisms have their lateral strengths proportional to the cubes of their diameters, or depths, directly, and their lengths and weights inversely.

10. Similar prisms and cylinders have their strength inversely proportional to their linear dimensions.

For other propositions relative to the resistance or strength of beams of various forms and in various positions, see the article *STRENGTH and Strefs of Materials*.

The following results are wholly drawn from experiments on different substances, by Emerson and other writers, by means of which the propositions stated in

the preceding part of this article may be submitted to computation.

The relative Resistances or Strengths of Wood and other Bodies.

	Proportional Resistance.
Box, yew, plum-tree, oak	11
Elm, ash	$8\frac{1}{2}$
Walnut, thorn	$7\frac{1}{2}$
Red fir, hollin, elder, plane crab-tree, apple-tree	7
Beech, cherry-tree, hazel	$6\frac{1}{2}$
Alder, asp, birch, white fir, willow	6
Iron	107
Brass	50
Bone	22
Lead	$6\frac{1}{2}$
Fine free-stone	1

A cylindrical rod of good clean fir, of an inch circumference, drawn in length, will bear at its extremity 400 lbs.; and a spear of fir, of two inches diameter, will bear about seven ton weight. A rod of good iron, of an inch circumference, will bear nearly three ton weight. A good hempen rope, of an inch circumference, will bear 1000 lbs. at its extremity. Hence Emerson concludes, that if a rod of fir, or a rope, or a rod of iron, of d inches diameter, were to lift a quarter of the extreme weight that they would support, then

The fir would bear $8\frac{1}{2} d^2$ hundred weight.

The rope - $22 d^2$ ditto.

The iron - $6\frac{3}{4} d^2$ tons.

To these results we may add, from the experiments and investigations of professor Robison, that a prism of white marble, an inch square and a foot long, bears about 500 lbs. And that, from the various authors he has collected, the cohesive force of a square inch of gold, when cast, is about 20,000 lbs.; of silver, 40,000 lbs.; cast iron from 40,000 to 60,000 lbs.; wrought iron from 60,000 to 90,000 lbs.; soft steel, 12,000 lbs.; razor steel, 15,000 lbs.; oak and beech, in the direction of their fibres, from 8000 to 17,000 lbs.; willow, 12,000 lbs.; cedar, 5000 lbs.; fir, 8000 lbs.; ivory, 16,000 lbs.; bone, 5000 lbs.; rope, 20,000 lbs. And a cylinder, an inch in diameter, loaded to one-fourth, will carry, if of iron, 135 cwt.; of rope, 22 cwt.; oak, 14 cwt.; and fir, 9 cwt.

The resistance of some metals is doubled, or tripled, by the operation of forging and wire-drawing; and the cohesive, as well as the repulsive, force of wood, is often increased by moderate compression. Oak will *suspend* much more than fir; but fir will *support* twice as much as oak; which difference is supposed to arise from the curvature of the fibres of oak; yet oak has been known to support, with safety, more than two tons for every square inch. Stone will support from 250 to 850 thousand pounds, on a foot square; brick, 300 lbs.; and sometimes they are practically made to support one-sixth as much. Stone is said to be capable of bearing a much greater weight in that position in which it is found in the quarry, than in any other position. See *STRENGTH of Materials*.

RESISTANCE of Fluids, in *Hydrostatics*, is the force with which bodies, moving in fluid mediums, are impeded and retarded in their motion.

A body moving in a fluid is resisted from two causes: the first, the cohesion of the parts of the fluid. For a body, in its motion, separating the parts of a liquid, must overcome the force with which those parts cohere.

The second is the inertia, or inactivity of matter, by which

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which a certain force is required to move the particles from their places, in order to let the body pass.

The retardation from the first cause is always the same in the same space, the body remaining the same, whatever be the velocity, that is, the resistance is as the space run through in the same time; in which ratio the velocity also increases; and therefore the resistance from the first cause is as the velocity itself.

The resistance from the second cause, when the same body moves through different fluids with the same velocity, follows the proportion of the matter to be removed in the same time, which is as the density of the fluid.

When the same body moves through the same fluid with different velocities, this resistance increases in proportion to the number of particles struck in an equal time; which number is as the space run through in that time, that is, as the velocity. But it also increases in proportion to the force with which the body strikes against every part; which force is also as the velocity of the body; and therefore, if the velocity be triple, the resistance is triple, from a triple number of parts to be removed. It is also triple from a stroke three times stronger against every particle; therefore the whole resistance is nine-fold, that is, as the square of the velocity. Hence, a body moved in a fluid is resisted partly in a ratio of the velocity, and partly in a duplicate ratio of it.

Hence, therefore, if d denotes the density of the fluid, v the velocity of the body, and a and b constant co-efficients; then $adv^2 + bv$ will be proportional to the whole resistance to the same body, moving with different velocities, in the same direction through fluids of different densities, but of the same tenacity. But to take into consideration the different tenacities of fluids, let t denote the tenacity, or the cohesion of the parts of the fluid; then $adv^2 + btv$ will be as the said whole resistance.

The quantity of resistance, however, arising from the cohesion of the parts of the fluids, is very trifling with respect to the other resistance, except in very glutinous ones; and it also increases in a much lower degree, being only as the velocity, while the other is as the square of the velocity. Hence then the term btv is very small, in respect of the other term adv^2 , and, consequently, the resistance is nearly as the latter term, or nearly as the square of the velocity: which formula has been employed by most authors, and is, indeed, very nearly the truth in slow motions; but in very rapid ones it is far from correct, not so much from the omission of the small term btv , due to the cohesion; but from the want of the full counter pressure on the hinder part of the body, by which means a vacuum, either perfect or partial, is left behind the body in its motion; and also perhaps to some compression or accumulation of the fluid against the fore-part of the body. Therefore, in order to conceive the resistance of fluids to a body moving in them, it is necessary to distinguish between those fluids which, being compressed by some incumbent weight, perpetually close up the space behind the body in motion, without permitting, for an instant, any vacuity to remain behind it; and those fluids which, not being sufficiently compressed, the space left behind the moving body remains for some time empty. These differences, in the resisting fluids, will occasion very remarkable varieties in the laws of their resistance, and are absolutely necessary to be considered in the determination of the action of the air on shot and shells; for the air partakes of both these affections, according to the different velocities of the projected body.

In treating of these resistances, the fluids may likewise be

considered as continued or discontinued, that is, as having their particles contiguous, or as being separated and unconnected, and also as either elastic or non-elastic.

If a fluid was so constituted, that all the particles composing it were at some distance from each other, and there was no action between them, then the resistance of a body moving in it would be easily computed, from the quantity of motion communicated to these particles: for instance, if a cylinder moved in such a fluid in the direction of its axis, it would communicate to the particles it met with a velocity equal to its own, and in its own direction, supposing that neither the cylinder, nor the parts of the fluid, were elastic; whence, if the velocity and diameter of the cylinder be known, and also the density of the fluid, there would thence be determined the quantity of motion communicated to the fluid, which, action and re-action being equal, is the same with the quantity lost by the cylinder, consequently the resistance would be thereby ascertained.

In this kind of discontinued fluid, the particles being detached from each other, every one of them can pursue its own motion in any direction, at least for some time, independent of the neighbouring ones; wherefore, if instead of a cylinder, moving in the direction of its axis, a body, with a surface oblique to its direction, be supposed to move in such a fluid, the motion which the parts of the fluid will hereby acquire, will not be in the direction of the resisted body, but perpendicular to its oblique surface; whence the resistance to such a body will not be estimated from the whole motion communicated to the particles of the fluid, but from that part of it only which is in the direction of the resisted body. In fluids then, where the parts are thus discontinued from each other, the different obliquities of that surface, which goes foremost, will occasion considerable changes in the resistance; although the section of the solid, by a plane perpendicular to its direction, should in all cases be the same. And Sir Isaac Newton has particularly determined, that, in a fluid thus constituted, the resistance of a globe is but half the resistance of a cylinder of the same diameter, moving in the direction of its axis with the same velocity.

But though the hypothesis of a fluid, thus constituted, be of great use in explaining the nature of resistances; yet, in reality, we know of no such fluid existing in nature; all the fluids, with which we are conversant, are so formed, that their particles either lie contiguous to each other, or at least act on each other in the same manner as if they did; consequently, in these fluids, no one particle contiguous to the resisted body can be moved, without moving at the same time a great number of others, some of which will be distant from it; and the motion thus communicated to a mass of the fluid, will not be in any one determined direction, but will in each particle be different, according to the different manners in which it lies in contact with those from which it receives its impulse; whence great numbers of the particles being diverted into oblique directions, the resistance of the moving body, which will depend on the quantity of motion communicated to the fluid in its own direction, will necessarily be different in quantity, from what it would be in the preceding supposition, and its estimation becomes much more complicated and operose.

If the fluid be compressed by the incumbent weight of its upper parts, as all the fluids are with us, except at their very surface, and if the velocity of the moving body be much less than that with which the parts of the fluid would rush into a void space, in consequence of their compression; it is evident, that in this case the space left by the moving body will be instantaneously filled up by the fluid; and the parts

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parts of the fluid, against which the foremost part of the body presses in its motion, will, instead of being impelled forwards in the direction of the body, circulate in some measure towards the hinder part of it, thereby to restore the equilibrium, which the constant influx of the fluid behind the body would otherwise destroy; whence the progressive motion of the fluid, and consequently the resistance of the body, which depends on it, would be in this instance much less than in the hypothesis, where each particle is supposed to acquire, from the stroke of the resisting body, a velocity equal to that with which the body moved, and in the same direction. Sir Isaac Newton has determined, that the resistance of a cylinder, moving in the direction of its axis, in such a compressed fluid as we have here treated of, is but one-fourth part of the resistance which the same cylinder would undergo, if it moved with the same velocity, in a fluid constituted in the manner described in the first hypothesis, each fluid being supposed to be of the same density.

But again, it is not only in the quantity of their resistance that these fluids differ, but likewise in the different manner in which they act on solids of different forms, moving in them. In the discontinued fluid, first described, the obliquity of the foremost surface of the moving body would diminish the resistance; but in compressed fluids this holds not true, at least not in any considerable degree; for the principal resistance in compressed fluids arises from the greater or lesser facility with which the fluid, impelled by the fore-part of the body, can circulate towards its hindermost part; and this being little, if at all, affected by the form of the moving body, whether it be cylindrical, conical, or spherical, it follows, that while the transverse section of the body, and consequently the quantity of impelled fluid is the same, the change of figure in the body will scarcely affect the quantity of its resistance.

And this case, that is, the resistance of a compressed fluid to a solid, moving in it with a velocity much less than what the parts of the fluid would acquire from their compression; this case has been very fully considered by Sir Isaac Newton, who has ascertained the quantity of such a resistance according to the different magnitudes of the moving body, and the density of the fluid. But he very expressly informs us, that the rules he has laid down are not generally true, but upon a supposition that the compression of the fluid be increased in the greater velocities of the moving body: however, some unskilful writers, who have followed him, overlooking this caution, have applied his determination to bodies moving with all kinds of velocities, without attending to the different compressions of the fluids they are resisted by; and by this means they have accounted the resistance of the air to musket and cannon-shot, to be but one-third part of what it is found to be by experience.

It is indeed evident, that the resisting power of the medium must be increased, when the resisting body moves so fast that the fluid cannot instantaneously press in behind it, and fill the deserted space; for when this happens the body will be deprived of the pressure of the fluid behind it; which in some measure balanced its resistance, and must support on its fore-part the whole weight of a column of the fluid, independent of the motion it gives to the parts of the fluid; and besides, the motion in the particles driven before the body, is, in this case, less affected by the compression of the fluid, and consequently they are less deflected from the direction in which they are impelled by the resisted surface; whence this species of resistance approaches more and more to that described in the first hypothesis, where

each particle of the fluid being unconnected with the neighbouring ones, it pursues its own motion, in its own direction, without being interrupted or deflected by their contiguity; and therefore, as the resistance of a discontinued fluid to a cylinder, moving in the direction of its axis, is four times greater than the resistance of a fluid sufficiently compressed of the same density; it follows, that the resistance of a fluid, when a vacuum is left behind the moving body, may be nearly four times greater than that of the same fluid, when no such vacuum is formed; for when a void space is thus left, the resistance approaches in its nature to that of a discontinued fluid.

This, then, may probably be the case in a cylinder moving in the same compressed fluid, according to the different degrees of its velocity; so that if it set out with a great velocity, and moves in the fluid till that velocity be much diminished, the resisting power of the medium may be nearly four times greater in the beginning of its motion than in the end.

In a globe the difference will not be so great, because, on account of its oblique surface, its resistance in a discontinued medium is but about twice as much as in one properly compressed; for its oblique surface diminishes its resistance in one case, and not in the other: however, as the compression of the medium, even when a vacuum is left behind the moving body, may yet confine the oblique motion of the parts of the fluid, which are driven before the body, and as in an elastic fluid, as the air is, there will be some degree of condensation in those parts; it is highly probable, that the resistance of a globe moving in a compressed fluid may greatly exceed the proportion of the resistance to slow motions.

And as this increase of the resisting power of the medium will take place, when the velocity of the moving body is so great that a perfect vacuum is left behind it, so some degree of augmentation will be sensible in velocities much short of this; for even when, by the compression of the fluid, the space left behind the body is instantaneously filled up; yet, if the velocity with which the parts of the fluid rush in behind, is not much greater than that with which the body moves, the same reasons we have urged above, in the case of an absolute vacuum, will hold in a less degree in this instance; and therefore we are not to suppose, that, in the increased resistance which we have hitherto treated of, it immediately vanishes, when the compression of the fluid is just sufficient to prevent a vacuum behind the resisted body; but we must consider it as diminishing only, according as the velocity with which the parts of the fluid follow the body, exceeds that with which the body moves.

Hence, then, we may conclude, that if a globe sets out in a resisting medium, with a velocity much exceeding that with which the particles of the medium would rush into a void space, in consequence of their compression, so that a vacuum is necessarily left behind the globe in its motion: the resistance of this medium to the globe will be near three times greater, in proportion to its velocity, than what we are sure, from Sir Isaac Newton, would take place in a slower motion. We may also farther conclude, that the resisting power of the medium will gradually diminish as the velocity of the globe decreases, till at last, when it moves with a velocity which bears but a small proportion to that with which the particles of the medium follow it, the resistance becomes the same with what is assigned by Sir Isaac Newton in the case of a compressed fluid.

And from this determination we see how false that position is, which asserts the resistance of any medium to be in the duplicate proportion of the velocity of the resisted body;

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body; for it is evident by what we have said, that this can only be considered as nearly true in small variations of velocity, and can never be applied in the comparing together of the resistances to all velocities whatever, without the most enormous errors. See *New Principles of Gunnery*, by Mr. Robins, chap. 2. prop. 1. See *RESISTANCE of the Air*. See also *PROJECTILE and GUNNERY*.

Resistance and retardation are used indifferently for each other, as being both in the same proportion, and the same resistance always generating the same retardation. But, with regard to different bodies, the same resistance frequently generates different retardations; the resistance being as the quantity of motion, and the retardation as that of the celerity. For the difference and measure of the two, see *RETARDATION*.

The retardations from this resistance may be compared together, by comparing the resistance with the gravity or quantity of matter. Thus, let v = the velocity; a = the area of the face, or end of a cylinder; n = the specific gravity of the fluid; $g = 32\frac{1}{2}$ feet, the force of gravity; then the altitude due to the velocity v being $\frac{v^2}{2g}$, the whole resistance, or motive force m , will be expressed by the following formulæ;

$$m = an \times \frac{v^2}{2g} = \frac{anv^2}{2g}; \text{ or } = \frac{anv^2s^3}{2g}$$

the latter having place when the motion is not in a direction perpendicular to the plane or end, but is inclined to it at a given angle, whose sine is s . For it is a known property, that, in this case, the resistance varies as the cube of the sine of the angle of inclination. If now w be made to denote the weight of the body, and f the retarding force; then, on the same principles, we derive

$$f = \frac{m}{w} = \frac{anv^2s^3}{2g w}$$

If the body be a cylinder, moving in the direction of its axis, and the diameter of the base equal d , or radius r , and $\pi = 3.14159$, &c. then

$$f = \frac{m}{w} = \frac{\pi n d^3 v^2}{8 g w} = \frac{\pi n r^2 v^2}{2 g w}$$

But when the cylinder moves in a direction perpendicular to its axis, then writing h for the height or length of the cylinder, we have

$$f = \frac{m}{w} = \frac{n v^2 h d}{3 g w} = \frac{n v^2 h r}{\frac{3}{2} g w}$$

And when it moves obliquely to its axis, then writing s for the sine of the angle of inclination, we have

$$f = \frac{n v^2 r h s^3}{2 g} \left\{ 1 - \frac{3s^2 - 1}{6} + \frac{3(s^2 - 1)^2}{40} + \frac{(s^2 + 5)(s^2 - 1)^2}{112} + \&c. \right\} + \frac{\pi n v^2 r^2}{2 g} \cdot (-s^2)^{\frac{3}{2}}$$

See Moore's *Theory of Military Rockets*.

If the body be a cone, then the same notation remaining, only writing s for the sine of the angle of inclination of the side of the cone; then

$$f = \frac{m}{w} = \frac{\pi n d^3 v^2 s^2}{8 g w} = \frac{\pi n r^2 v^2 s^2}{2 g w}$$

For, in this case, the inclination has no effect in reducing the section opposed to the resistance of the fluid, this being the same as in the cylinder, and therefore will vary as s^2 .

The same notation still remaining, it is found, from a fluxional investigation (see Gregory's *Mechanics*, vol. i.) that the resistance of the body, when terminated with a hemispherical surface, is

$$f = \frac{m}{w} = \frac{\pi n d^3 v^2}{16 g w} = \frac{\pi n r^2 v^2}{4 g w}$$

that is, half what it is when the end is a plane surface.

Hence the resistance of a sphere, when impelled through any fluid, is equal to half the direct resistance to a great circle of it, or to a cylinder of the same diameter. Since $\frac{1}{2} \pi d^3$ is the magnitude of the globe, if N denotes its density, or specific gravity, its weight $w = \frac{1}{2} \pi N d^3$; and, therefore, the retardive force becomes

$$f = \frac{m}{w} = \frac{\pi n v^2 d^3}{16 g w} \times \frac{6}{\pi N d^3} = \frac{3 n v^2}{8 g N d} = \frac{v^2}{2 g s}$$

where s is the space described; for $2 f g s = v^2$, by the law of accelerated or retarded motions. From which it appears, that the resistance varies as the square of the velocity directly, and as the diameter inversely, all things else being the same; and hence the reason, why a large ball overcomes resistance better than a smaller one.

James Bernouilli demonstrates the following theorems, *Acta Erud. Lips.* for June 1693, p. 252, &c.

1. If an isosceles triangle be moved in a fluid according to the direction of a line perpendicular to its base; first, with the vertex foremost, and then with its base; the resistances will be in the duplicate ratio of the base, and of the sum of the legs.

2. The resistance of a square, moved according to the direction of its side, is to the resistance of the same square, moved with the same celerity in the direction of its diagonal, as the diagonal is to the side.

3. The resistance of a circular segment, less than a semicircle, carried in a direction perpendicular to its base, when it goes with the base foremost, and when with its vertex foremost (the same direction and celerity continuing), is as the square of the same diameter to the same, less one-third of the square of the base of the segment. Hence, the resistances of a semicircle, when its base and when its vertex go foremost, are to one another in a sesquialterate ratio.

4. A parabola moving in the direction of its axis, first with its base, and then its vertex foremost, has its resistances as the tangent to an arc of a circle, whose diameter is equal to the parameter, and the tangent equal to half the base of the parabola.

5. The resistances of an hyperbola and ellipsis, when the vertex and base go foremost, may be thus computed. Say, as the sum (or difference) of the transverse axis and latus rectum is to the transverse axis, so is the square of the latus rectum to the square of the diameter of a certain circle; in which circle apply a tangent, equal to half the base of the hyperbola or ellipse. Then say again, as the sum (or difference) of the axis and parameter is to the parameter, so is the aforefaid tangent to another right line. And farther, as the sum (or difference) of the axis and parameter is to the axis, so is the circular arc corresponding to the aforefaid tangent to another arc. This done, the resistances will be as the tangent to the sum (or difference) of the right line thus found, and the arc last mentioned.

6. In the general, the resistances of any figure whatever, going now with its base foremost, and then with its vertex, are as the figures of the base to the sum of all the cubes of the elements of the base, divided by the squares of the elements of the curve line.

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All which rules may be of use in the construction of ships, and in perfecting the art of navigation univerfally; as also for determining the figures of the balls of pendulums for clocks, &c.

RESISTANCE of Fluid Mediums to the Motion of Falling Bodies.—A body freely descending in a fluid is accelerated by the respective gravity of the body, which continually acts upon it, yet not equably, as in a vacuum: the resistance of the fluid occasions a retardation, that is, a diminution of acceleration, which diminution increases with the velocity of the body. Now there is a certain velocity, which is the greatest a body can acquire by falling; for if its velocity be such, that the resistance arising from it becomes equal to the respective weight of the body, its motion can be no longer accelerated; for the motion here continually generated by the respective gravity, will be destroyed by the resistance, and the body forced to go on equably. A body continually comes nearer and nearer to this greatest celerity, but can never attain to it.

When the densities of a fluid body are given, the respective weight of the body may be known; and by knowing the diameter of the body, it may be found from what height a body falling in vacuo can acquire such a velocity as that the resistance in a fluid shall be equal to that respective weight, which will be that greatest velocity above-mentioned. If the body be a sphere, it is known, that a sphere is equal to a cylinder of the same diameter, whose height is two-third parts of that diameter; which height is to be increased in the ratio in which the respective weight of the body exceeds the weight of the fluid, in order to have the height of a cylinder of the fluid, whose weight is equal to the respective weight of the body; but if you double this height, you will have a height from which a body falling in vacuo acquires such a velocity as generates a resistance equal to this respective weight, and which therefore is the greatest velocity which a body can acquire, by falling in a fluid, from an infinite height. Lead is eleven times heavier than water, and therefore its respective weight is to the weight of water, as ten to one; therefore a leaden ball, as appears from what has been said, cannot acquire a greater velocity, in falling in water, than it would acquire in falling in vacuo, from a height of $13\frac{1}{3}$ of its diameters.

A body lighter than a fluid, and ascending in it by the action of the fluid, is moved exactly by the same laws as a heavier body falling in the fluid. Wherever the body is placed, it is sustained by the fluid, and carried up with a force equal to the difference between the weight of a quantity of the fluid of the same bulk as the body, and the body itself; by which not only the action of gravity of the body is destroyed; but the body is also carried upwards by a motion equably accelerated, in the same manner as a body heavier than a fluid descends by its respective gravity: but the equality of the acceleration is destroyed in the same manner by the resistance, in the ascent of a body lighter than the fluid, as it is destroyed in the descent of a body heavier.

When a body specifically heavier than a fluid is thrown in it, it is retarded upon a double account; on account of the gravity of the body, and on account of the resistance of the fluid; consequently, a body rises to a less height than it would rise to in vacuo with the same celerity. But the defects of the height in a fluid from the height to which a body would rise in vacuo with the same celerity, have a greater proportion to each other than the heights themselves; and in less heights the defects are nearly as the squares of the heights in vacuo.

In order to submit the above principles to accurate computation, we must refer back to our preceding determination

of the retardative force of a fluid to a body moving it, which we found to be

$$f = \frac{m}{w} = \frac{\pi n v^2 d^2}{16 g w} \times \frac{6}{\pi N d^3} = \frac{3 n v^2}{8 g N d} = \frac{v^2}{2 g s};$$

from the two latter terms of which we have $s = \frac{N}{n} \times \frac{1}{3} d$;

which is the space that would be described by the globe, while its whole motion is generated or destroyed by a constant force, which is equal to the forces of resistance, if no other force acted on the globe to continue its motion. And if the density of the fluid were equal to that of the globe, the resisting force is such as, acting constantly on the globe without any other force, would generate or destroy its motion in describing the space $\frac{1}{3}d$, or $\frac{1}{3}$ of its diameter, by that accelerating or retarding force.

Hence the greatest velocity that a ball will acquire by descending in a fluid by means of its relative weight in that fluid, will be found by making the resisting force equal to that weight. For, after the velocity has arrived at such a degree, that the resisting force is equal to the weight that urges it, it will increase no longer, and the globe will then continue to descend with an uniform velocity.

Now N and n being the separate specific gravities of the globe and fluid, $N - n$ will be the relative gravity of the globe in the fluid; and, therefore, $w = \frac{1}{6} \pi d^3 (N - n)$

is the weight by which it is urged, $m = \frac{\pi n v^2 d^2}{16 g}$ is the

resistance; consequently $\frac{\pi n v^2 d^2}{16 g} = \frac{1}{6} \pi d^3 (N - n)$

when the velocity becomes uniform; whence we obtain

$$v = \sqrt{\left(2g \times \frac{1}{3}d \times \frac{N - n}{n}\right)}$$

for the uniform or greatest velocity of the globe.

Thus, for example, if a leaden ball one inch in diameter descend in water, and in air of the same density as at the earth's surface; the three specific gravities being, lead

= $11\frac{1}{3}$, water = 1, and air = $\frac{3}{2500}$; then

$$v = \sqrt{\left(2 \times 32\frac{1}{2} \times \frac{4}{36} \times 10\frac{1}{3}\right)} = 8.5944 \text{ feet}$$

per second for the greatest velocity in water; and

$$v = \sqrt{\left(4 \times \frac{193}{12} \times \frac{4}{36} \times \frac{34}{3} \times \frac{2500}{3}\right)} = 259.82 \text{ feet}$$

per second for the greatest velocity in air.

But as this velocity, all other things being the same, varies as \sqrt{d} ; it follows that a ball of $\frac{1}{100}$ th of an inch diameter would only acquire velocities $\frac{1}{10}$ th of those given above. Hence it appears, how soon small bodies come to their greatest or uniform velocity in descending in fluids, and how very small that velocity is; which explains the reason of the slow precipitation of mud and small particles in water, as also why, in precipitations, the larger and gross particles descend soonest and lowest.

It appears also, from the preceding formulæ, that where $N = n$, or the density of the body is equal to that of the fluid; then $N - n = 0$, and consequently the velocity and space are in this case both equal to zero, as they ought to be.

Again, when the body is lighter than the fluid, then $N - n$ becomes negative, and the motion and force both tend the contrary way; that is, the ball will ascend by the same

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same laws by which, in the preceding case, the heavier body descended, as stated in the preceding part of this article.

RESISTANCE of the Air, in *Pneumatics*, is the force with which the motion of bodies, particularly of projectiles, is retarded by the opposition of the air or atmosphere. See GUNNERY.

The air being a fluid, the general laws of the resistance of fluids obtain in it, except that the different degrees of density, in the different stages or regions of the atmosphere, occasion some irregularity.

As to the resistance of the air, it has been thus determined from experiments. Mr. Robins, in his *New Principles of Gunnery*, chap. 2. prop. 2, &c. having taken a musket barrel, and charging it successively with a leaden ball of three-quarters of an inch diameter, and about half its weight of powder, and taking such precaution in weighing of the powder, and placing it, as to be sure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1" from its medium quantity, fired it against a pendulum, called the ballistic pendulum, (described under GUNNERY), placed at 25 feet, at 75 feet, and at 125 feet distance from the mouth of the piece respectively. In the first case, it impinged against the pendulum with a velocity of 1670 feet in 1"; in the second case, with a velocity of 1550 feet in 1"; and in the third case, with a velocity of 1425 feet in 1"; so that in passing through 50 feet of air, the bullet lost a velocity of about 120 or 125 feet in 1"; and the time of its passing through that space being about $\frac{1}{17}$ or $\frac{1}{20}$ th of 1", the medium quantity of resistance must, in these instances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{16}$ th of a pound, amounts to about 10lbs. avoirdupois.

Now, if a computation be made, according to the method laid down for compressed fluids, in the 38th propof. of lib. ii. of sir Isaac Newton's *Principia*, supposing the weight of water to be to the weight of air as 850 to 1, it will be found that the resistance of a globe of three-quarters of an inch diameter, moving with a velocity of about 1600 feet in 1", will not, on those principles, amount to any more than a force of 4½lbs. avoirdupois; whence we may conclude, the rules in that proposition for slow motions being very accurate, that the resisting power of the air in slow motions is less than in swift motions, in the ratio of 4½ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again, charging the same piece with equal quantities of powder, and balls of the same weight, and firing three times at the pendulum, placed at 25 feet distance from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in 1". Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five shots, was that of 1300 feet in 1". Whence the ball, in passing through 150 feet of air, lost a velocity of about 390 feet in 1"; and the resistance, computed from these numbers, gives something more than in the preceding instance, amounting to between 11 and 12 pounds avoirdupois: whence, according to these experiments, the resisting power of the air to swift motions is greater than in slow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments. Next, to examine this resistance in smaller velocities, the pendulum being placed at 25 feet distance, was fired at five times, with an equal charge each time, and the mean velocity with which the ball impinged, was that of 1180 feet in 1". Then removing the pendulum to the distance of 250 feet, the medium velocity of five shot, at this distance, was that of 950 feet in 1"; whence the ball, in passing through 225 feet of air, lost a velocity of 230 feet in 1", and as it passed through that interval in about $\frac{1}{17}$ ths of 1", the resistance to the middle velocity will come out to be near 33½ times the gravity of

the ball, or 2lb. 10oz. avoirdupois. Now the resistance to the same velocity, according to the laws observed in slower motions, amounts to $\frac{1}{17}$ ths of the same quantity; whence, in a velocity of 1065 feet in 1" (the medium of 1180 and 950), the resisting power of the air is augmented in no greater proportion than that of 7 to 11; whereas, in greater degrees of velocity, as before, it amounted very nearly to the ratio of 1 to 3.

By other experiments, it appears, that the resistance of the air is very sensibly increased, even in so small a velocity as that of 400 feet in 1".

That this resisting power of the air to swift motions is very sensibly increased beyond what sir Isaac's theory for slow motions makes it, seems hence to be evident. It being, as has been said, in musket, or cannon shot, with their full charge of powder, nearly three times the quantity assigned by that theory.

However, this increased power of resistance diminishes as the velocity of the resisted body diminishes, till at length, when the motion is sufficiently abated, the actual resistance coincides with that supposed in the theory.

The resistance of a bullet of three-quarters of an inch diameter, moving in air with the velocity of 1670 feet in 1", amounting, as we said, to 10lbs., the resistance of a cannon ball of 24lbs., fired with 16lbs., or its full charge of powder, and thereby moving with a velocity of 1650 feet in 1", (which scarcely differs from the other), may hence be determined. For the velocity of the cannon ball being nearly the same as the musket bullet, and its surface above 54 times greater, it follows, that the resistance on the cannon ball will amount to more than 540lbs. which is nearly 23 times its own weight.

Euler has shewn, that the common doctrine of resistance answers very well when the motion is not very swift, but in very swift motions it gives the resistance less than it ought to be, on two accounts. 1. Because in very quick motions the air does not fill up the space behind the body fast enough to press on the hinder parts, that the resistance on the fore part is increased. 2. The density of the air before the ball, being increased by the quick motion, will press more strongly on the fore part, and, being heavier than in its natural state, will retard its motion.

He has also shewn, that Mr. Robins has restrained his rule to velocities not exceeding 1670 feet in 1"; whereas, had he extended it to greater velocities, the result must have been erroneous: as he apprehends that it is not perfectly exact, when the motion is not extremely swift. He has investigated a formula for determining the degree of this resistance, and deduced conclusions differing from those of Mr. Robins. See *Principles of Gunnery investigated*, &c. 1777, p. 224, &c.

Mr. Robins having proved that, in very great changes of velocity, the resistance does not accurately follow the duplicate proportion of the velocity, lays down two positions, which may be of considerable service in the practice of artillery, till a more complete and accurate theory of resistance, and the changes of its augmentation, may be obtained. The first of these is, that till the velocity of the projectile surpasses that of 1100 feet in a second, the resistance may be esteemed to be in the duplicate proportion of the velocity: and the second is, that if the velocity be greater than that of 1100 or 1200 feet in a second, the absolute quantity of the resistance will be nearly three times as great as it should be by a comparison with the smaller velocities. Upon these principles, he proceeds in approximating the actual ranges of pieces with small angles of elevation, *viz.* such as do not exceed 8° or 10°, which he sets down in a table, compared with their corresponding potential ranges. See his *Mathematical Tracts*, vol. i. p. 179, &c.

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All which rules may be of use in the construction of ships, and in perfecting the art of navigation univerfally; as alfo for determining the figures of the balls of pendulums for clocks, &c.

RESISTANCE of Fluid Mediums to the Motion of Falling Bodies.—A body freely defcending in a fluid is accelerated by the refpective gravity of the body, which continually acts upon it, yet not equably, as in a vacuum: the refiftance of the fluid occafions a retardation, that is, a diminution of acceleration, which diminution increafes with the velocity of the body. Now there is a certain velocity, which is the greateft a body can acquire by falling; for if its velocity be fuch, that the refiftance arifing from it becomes equal to the refpective weight of the body, its motion can be no longer accelerated; for the motion here continually generated by the refpective gravity, will be deftroyed by the refiftance, and the body forced to go on equably. A body continually comes nearer and nearer to this greateft celerity, but can never attain to it.

When the denfities of a fluid body are given, the refpective weight of the body may be known; and by knowing the diameter of the body, it may be found from what height a body falling in vacuo can acquire fuch a velocity as that the refiftance in a fluid fhall be equal to that refpective weight, which will be that greateft velocity above-mentioned. If the body be a fphere, it is known, that a fphere is equal to a cylinder of the fame diameter, whofe height is two-third parts of that diameter; which height is to be increafed in the ratio in which the refpective weight of the body exceeds the weight of the fluid, in order to have the height of a cylinder of the fluid, whofe weight is equal to the refpective weight of the body; but if you double this height, you will have a height from which a body falling in vacuo acquires fuch a velocity as generates a refiftance equal to this refpective weight, and which therefore is the greateft velocity which a body can acquire, by falling in a fluid, from an infinite height. Lead is eleven times heavier than water; wherefore its refpective weight is to the weight of water, as ten to one; therefore a leaden ball, as appears from what has been faid, cannot acquire a greater velocity, in falling in water, than it would acquire in falling in vacuo, from a height of $13\frac{1}{2}$ of its diameters.

A body lighter than a fluid, and afcending in it by the action of the fluid, is moved exactly by the fame laws as a heavier body falling in the fluid. Wherever the body is placed, it is fufained by the fluid, and carried up with a force equal to the difference between the weight of a quantity of the fluid of the fame bulk as the body, and the body itfelf; by which not only the action of gravity of the body is deftroyed; but the body is alfo carried upwards by a motion equably accelerated, in the fame manner as a body heavier than a fluid defcends by its refpective gravity: but the equality of the acceleration is deftroyed in the fame manner by the refiftance, in the afcent of a body lighter than the fluid, as it is deftroyed in the defcent of a body heavier.

When a body fpecifically heavier than a fluid is thrown in it, it is retarded upon a double account; on account of the gravity of the body, and on account of the refiftance of the fluid; confequently, a body rifes to a lefs height than it would rife to in vacuo with the fame celerity. But the defects of the height in a fluid from the height to which a body would rife in vacuo with the fame celerity, have a greater proportion to each other than the heights themfelves; and in lefs heights the defects are nearly as the fquares of the heights in vacuo.

In order to fubmit the above principles to accurate computation, we muft refer back to our preceding determination

of the retardative force of a fluid to a body moving it, which we found to be

$$f = \frac{m}{\omega} = \frac{\pi n v^2 d^2}{16 g \omega} \times \frac{6}{\pi N d^3} = \frac{3 n v^2}{8 g N d} = \frac{v^2}{2 g s};$$

from the two latter terms of which we have $s = \frac{N}{n} \times \frac{1}{2} d$;

which is the fpace that would be defcribed by the globe, while its whole motion is generated or deftroyed by a conftant force, which is equal to the forces of refiftance, if no other force acted on the globe to continue its motion. And if the denfity of the fluid were equal to that of the globe, the refifting force is fuch as, acting conftantly on the globe without any other force, would generate or deftroy its motion in defcribing the fpace $\frac{1}{2} d$, or $\frac{1}{2}$ of its diameter, by that accelerating or retarding force.

Hence the greateft velocity that a ball will acquire by defcending in a fluid by means of its relative weight in that fluid, will be found by making the refifting force equal to that weight. For, after the velocity has arrived at fuch a degree, that the refifting force is equal to the weight that urges it, it will increafe no longer, and the globe will then continue to defcend with an uniform velocity.

Now N and n being the feparate fpecific gravities of the globe and fluid, $N - n$ will be the relative gravity of the globe in the fluid; and, therefore, $\omega = \frac{1}{2} \pi d^3 (N - n)$

is the weight by which it is urged, $m = \frac{\pi n v^2 d^2}{16 g}$ is the

refiftance; confequently $\frac{\pi n v^2 d^2}{16 g} = \frac{1}{2} \pi d^3 (N - n)$

when the velocity becomes uniform; whence we obtain

$$v = \sqrt{\left(2 g \times \frac{1}{2} d \times \frac{N - n}{n}\right)}$$

for the uniform or greateft velocity of the globe.

Thus, for example, if a leaden ball one inch in diameter defcend in water, and in air of the fame denfity as at the earth's furface; the three fpecific gravities being, lead

= 111 $\frac{1}{2}$, water = 1, and air = $\frac{3}{2500}$; then

$$v = \sqrt{\left(2 \times 32\frac{1}{2} \times \frac{4}{36} \times 10\frac{1}{2}\right)} = 8.5944 \text{ feet}$$

per fecond for the greateft velocity in water; and

$$v = \sqrt{\left(4 \times \frac{193}{12} \times \frac{4}{36} \times \frac{34}{3} \times \frac{2500}{3}\right)} = 259.82 \text{ feet}$$

per fecond for the greateft velocity in air.

But as this velocity, all other things being the fame, varies as \sqrt{d} ; it follows that a ball of $\frac{1}{10}$ th of an inch diameter would only acquire velocities $\frac{1}{10}$ th of thofe given above. Hence it appears, how foon fmall bodies come to their greateft or uniform velocity in defcending in fluids, and how very fmall that velocity is; which explains the reafon of the flow precipitation of mud and fmall particles in water, as alfo why, in precipitations, the larger and grofs particles defcend foonest and loweft.

It appears alfo, from the preceding formulæ, that where $N = n$, or the denfity of the body is equal to that of the fluid; then $N - n = 0$, and confequently the velocity and fpace are in this cafe both equal to zero, as they ought to be.

Again, when the body is lighter than the fluid, then $N - n$ becomes negative, and the motion and force both tend the contrary way; that is, the ball will afcend by the

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same laws by which, in the preceding case, the heavier body descended, as stated in the preceding part of this article.

RESISTANCE of the Air, in *Pneumatics*, is the force with which the motion of bodies, particularly of projectiles, is retarded by the opposition of the air or atmosphere. See *GUNNERY*.

The air being a fluid, the general laws of the resistance of fluids obtain in it, except that the different degrees of density, in the different stages or regions of the atmosphere, occasion some irregularity.

As to the resistance of the air, it has been thus determined from experiments. Mr. Robins, in his *New Principles of Gunnery*, chap. 2. prop. 2, &c. having taken a musket barrel, and charging it successively with a leaden ball of three-quarters of an inch diameter, and about half its weight of powder, and taking such precaution in weighing of the powder, and placing it, as to be sure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1" from its medium quantity, fired it against a pendulum, called the ballistic pendulum, (described under *GUNNERY*), placed at 25 feet, at 75 feet, and at 125 feet distance from the mouth of the piece respectively. In the first case, it impinged against the pendulum with a velocity of 1670 feet in 1"; in the second case, with a velocity of 1550 feet in 1"; and in the third case, with a velocity of 1425 feet in 1"; so that in passing through 50 feet of air, the bullet lost a velocity of about 120 or 125 feet in 1"; and the time of its passing through that space being about $\frac{1}{2}$ or $\frac{1}{3}$ th of 1", the medium quantity of resistance must, in these instances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{16}$ th of a pound, amounts to about 10lbs. avoirdupois.

Now, if a computation be made, according to the method laid down for compressed fluids, in the 38th propof. of lib. ii. of sir Isaac Newton's *Principia*, supposing the weight of water to be to the weight of air as 850 to 1, it will be found that the resistance of a globe of three-quarters of an inch diameter, moving with a velocity of about 1600 feet in 1", will not, on those principles, amount to any more than a force of 4½lbs. avoirdupois; whence we may conclude, the rules in that proposition for slow motions being very accurate, that the resisting power of the air in slow motions is less than in swift motions, in the ratio of 4½ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again, charging the same piece with equal quantities of powder, and balls of the same weight, and firing three times at the pendulum, placed at 25 feet distance from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in 1". Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five shots, was that of 1300 feet in 1". Whence the ball, in passing through 150 feet of air, lost a velocity of about 390 feet in 1"; and the resistance, computed from these numbers, gives something more than in the preceding instance, amounting to between 11 and 12 pounds avoirdupois: whence, according to these experiments, the resisting power of the air to swift motions is greater than in slow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments. Next, to examine this resistance in smaller velocities, the pendulum being placed at 25 feet distance, was fired at five times, with an equal charge each time, and the mean velocity with which the ball impinged, was that of 1180 feet in 1". Then removing the pendulum to the distance of 250 feet, the medium velocity of five shot, at this distance, was that of 950 feet in 1"; whence the ball, in passing through 225 feet of air, lost a velocity of 230 feet in 1", and as it passed through that interval in about $\frac{1}{4}$ ths of 1", the resistance to the middle velocity will come out to be near 33½ times the gravity of

the ball, or 2lb. 10oz. avoirdupois. Now the resistance to the same velocity, according to the laws observed in slower motions, amounts to $\frac{1}{16}$ ths of the same quantity; whence, in a velocity of 1065 feet in 1" (the medium of 1180 and 950), the resisting power of the air is augmented in no greater proportion than that of 7 to 11; whereas, in greater degrees of velocity, as before, it amounted very nearly to the ratio of 1 to 3.

By other experiments, it appears, that the resistance of the air is very sensibly increased, even in so small a velocity as that of 400 feet in 1".

That this resisting power of the air to swift motions is very sensibly increased beyond what sir Isaac's theory for slow motions makes it, seems hence to be evident. It being, as has been said, in musket, or cannon shot, with their full charge of powder, nearly three times the quantity assigned by that theory.

However, this increased power of resistance diminishes as the velocity of the resisted body diminishes, till at length, when the motion is sufficiently abated, the actual resistance coincides with that supposed in the theory.

The resistance of a bullet of three-quarters of an inch diameter, moving in air with the velocity of 1670 feet in 1", amounting, as we said, to 10lbs., the resistance of a cannon ball of 24lbs., fired with 16lbs., or its full charge of powder, and thereby moving with a velocity of 1650 feet in 1", (which scarcely differs from the other), may hence be determined. For the velocity of the cannon ball being nearly the same as the musket bullet, and its surface above 54 times greater, it follows, that the resistance on the cannon ball will amount to more than 540lbs. which is nearly 23 times its own weight.

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Since the above experiments of Mr. Robins, Dr. Hutton has profecuted the subject to a much greater length. His experiments were made not only with the whirling machine invented by the former, but with cannon balls of different weights, from 1lb. to 6lbs. ; as also with figures of various shapes, and with planes set at a variety of angles of inclina-

tions to the path of motion. From these experiments the author has ascertained the resistance of bodies to all velocities, from 1 to 2000 feet *per* second ; the bodies being different, and their faces at different angles of elevation. Some of his general tables, and conclusions from those experiments, are as follows.

TABLE I. Of Resistances of different Bodies.

Velocity per Second.	Small Hemisphere, flat Side.	Large Hemisphere.		Cone.		Cylinder.	Whole Globe.	Resistance as the Power of the Velocity.
		Flat Side.	Convex Part.	Vertex.	Base.			
feet.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
3	.028	.051	.020	.028	.064	.050	.027	
4	.048	.096	.039	.048	.109	.090	.047	
5	.072	.148	.063	.071	.161	.143	.068	
6	.103	.211	.092	.098	.225	.205	.094	
7	.141	.284	.123	.129	.289	.278	.125	
8	.184	.368	.160	.168	.382	.360	.162	
9	.233	.464	.199	.211	.478	.456	.225	
10	.487	.573	.242	.260	.587	.566	.255	
11	.349	.698	.292	.315	.712	.688	.310	2.052
12	.418	.836	.347	.376	.850	.826	.370	2.042
13	.492	.988	.409	.440	1.000	.978	.435	2.936
14	.573	1.154	.478	.512	1.166	1.143	.305	2.031
15	.661	1.336	.552	.589	1.346	1.327	.581	2.036
16	.754	1.538	.634	.673	1.546	1.526	.663	2.033
17	.853	1.757	.722	.762	1.763	1.745	.752	2.038
18	.959	1.998	.818	.858	2.002	1.986	.848	2.044
19	1.073	2.258	.922	.959	2.260	2.246	.949	2.047
20	1.196	2.542	1.069	1.069	2.540	2.528	1.057	2.051
Mean proportional numbers.	140	288	119	126	291	285	124	2.040
1	2	3	4	5	6	7	8	9

In this table are contained the resistances of several forms of bodies, when moved with several degrees of velocity, from 3 feet *per* second to 20 feet *per* second. The names of the bodies are at the tops of the columns, as also which end went foremost through the air ; the different velocities are in the first column, and the resistance, on the same line in their several columns in avoirdupois ounces and decimal parts. Thus, on the first line are contained the resistances when the bodies move with a velocity of three feet in a second ; *viz.* in the second column, for the small hemisphere of $4\frac{2}{3}$ inches diameter, its resistance .028 ounces, when the flat side went foremost ; in the third and fourth columns, the resistances to a large hemisphere, first with the flat side, and next with the convex part foremost ; the diameter of this, as well as all the following figures, being $6\frac{2}{3}$ inches, and therefore the area of the great circle = 32 square inches, or $\frac{2}{3}$ of a square foot ; then in the fifth and sixth columns are the resistances of a cone, first, with its vertex, and then with its base foremost ; the altitude of the cone being $6\frac{2}{3}$ inches, the same as the diameter of its base ; in the seventh column, the resistance to the end of the cylinder ; and in the eighth, that against the whole globe or sphere. All the numbers shew the real weights which are equal to the resistances ; and at the bottoms of the columns are placed proportional numbers, which shew the mean proportions of the resistances of all the figures to each other with any velocity. Lastly, in the ninth column are placed the exponents of the power of the velocity which the resistances in the eighth column bear

to each other, *viz.* which that of the 10 feet velocity bears to each of the following ones ; the medium of all them being as the 2.04 power of the velocity ; that is, very little above the square, or second power, so far as the velocities in this table extends.

From this table the following inferences are readily deduced.

1. That the resistance is nearly in the same proportion as the surfaces ; a small increase only taking place in the greatest surfaces, and for the greater velocities : thus, by comparing together the numbers in the second and third columns for the bases of the two hemispheres, the areas of which bases are in the proportion of $17\frac{3}{4}$ to 32, or 5 to 9 very nearly, it appears that the numbers in these two columns, expressing the resistances, are nearly as 1 to 2, or 5 to 10, as far as the velocity of 12 feet : but after that, the resistances on the greater surface increase gradually more and more above that proportion.

2. The resistance to the same surface, with different velocities, is, in these slow motions, nearly as the square of the velocity ; but gradually increases more and more above that proportion, as the velocity increases. This is manifest from all the columns ; and from the index of the power of the velocity set down in the ninth column for the resistances in the eighth, the medium of which being 2.04, shews that the resistance to the same body is, in these slow motions, as the 2.04 power of the velocity, or nearly as the square of it.

3. The round ends, and the sharp ends, of solids, suffer less

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less resistance than the flat or plane ends of the same diameter; but the sharper end has not always the least resistance. Thus, the cylinder, and the flat ends of the hemisphere, and cone, have more resistance than the round or sharp ends of the same, but the round side of the hemisphere has less resistance than the sharp end of the cone.

4. The resistance on the base of the hemisphere is to that of its convex part, as $2\frac{1}{2}$ to 1, instead of 2 to 1, as given by theory. The experimented resistances also exceed the theoretical by nearly $\frac{1}{4}$ th.

5. The resistance on the base of the cone is to that on its vertex, nearly as $2\frac{1}{5}$ to 1, which is the same as the ratio of the sine of the angle of inclination of the side of the cone to its axis; so that, in this instance, the resistance is as the sine of the angle of incidence.

6. When the hinder parts of different bodies are of different forms, the resistances are different, although the fore part be exactly the same; owing probably to the different pressures of the air on the hinder parts.

Thus the resistance to the fore-part of the cylinder is less than on the equal flat surface of the cone, or of the hemisphere; and the resistance on the base of the hemisphere less than that of the cone; and the round side of the hemisphere less than the whole sphere.

TABLE II. Resistance, both by Experiment and Theory, to a Globe of 1.965 Diameter.

Velocity per Second in Feet.	Resistance by Experiment in Ounces.	Resistance by Theory in Ounces.	Ratio of Experiment to Theory.	Resistance as the Power of the Velocity.
5	0.006	0.005	1.20	
10	0.024 $\frac{1}{2}$	0.020	1.23	
15	0.055	0.044	1.25	
20	0.100	0.079	1.27	
25	0.157	0.123	1.28	2.022
30	0.23	0.177	1.30	2.052
40	0.42	0.314	1.33	2.068
50	0.67	0.491	1.36	2.075
100	2.72	1.964	1.38	2.059
200	11	7.9	1.40	2.041
300	25	18.7	1.41	2.039
400	45	31.4	1.43	2.039
500	72	49	1.47	2.044
600	107	71	1.51	2.051
700	151	96	1.57	2.059
800	205	126	1.63	2.067
900	271	159	1.70	2.077
1000	350	196	1.78	2.086
1100	442	238	1.86	2.095
1200	546	283	1.90	2.102
1300	661	332	1.99	2.107
1400	785	385	2.04	2.111
1500	916	442	2.07	2.113
1600	1051	503	2.09	2.113
1700	1186	568	2.08	2.111
1800	1319	636	2.07	2.108
1900	1447	709	2.04	2.104
2000	1569	786	2.00	2.098

In the first column of this table are contained the several velocities, gradually, from 5 feet per second to the greatest velocity of 2000 feet per second, with which a globe or ball is moved. In the second column are the experimented

resistances in avoirdupois ounces. In the third, the corresponding resistances as deduced from theory. In the fourth column the ratio of these two resistances, or the quotients of the former divided by the latter; and the fifth, or last, the indices of the power of the velocity which is proportional to the experimented resistances, and which are found by comparing the resistance of 20 feet velocity with each of the following ones.

The following tables are of a similar kind, but the experiments are repeated on balls of different sizes.

TABLE III.—Resistances to a ball of 1.965 inch diameter, and 16 oz. 13 dr. weight.

Velocity. feet.	Resistances.		1st Dif.	2d Dif.
	lbs.	oz.		
100	0.17	2 $\frac{3}{4}$		
200	0.69	11	8 $\frac{1}{4}$	
300	1.56	25	14	6
400	2.81	45	20	7
500	4.50	72	27	8
600	6.69	107	35	9
700	9.44	151	44	10
800	12.81	205	54	12
900	16.94	271	66	13
1000	21.88	350	79	13
1100	27.63	442	92	12
1200	34.13	546	104	11
1300	41.31	661	115	9
1400	49.06	785	124	7
1500	57.25	916	131	4
1600	65.69	1051	135	0
1700	74.13	1186	135	-2
1800	82.44	1319	133	-5
1900	90.44	1447	128	-6
2000	98.06	1569	122	

TABLE IV.—Resistances to a ball 2.78 inc. diameter, and 3lb. weight.

Velocity.	Ref.	Diff.
feet.	lbs.	
900	35	6
950	41	6
1000	47	6
1050	53	7
1100	60	7
1150	67	7
1200	74	8
1250	82	9
1300	91	10
1350	101	11
1400	112	10 $\frac{1}{2}$
1450	122 $\frac{1}{2}$	10 $\frac{1}{2}$
1500	132 $\frac{1}{2}$	10
1550	141 $\frac{1}{2}$	9
1600	150	8 $\frac{1}{2}$
1650	158	8
1700	165	7
1750	171	6
1800	176	5

TABLE V.—Resistances to a ball 3.55 inc. diameter, and 6lb. 1 oz. 8 dr. weight.

Velocity.	Ref.	Diff.
feet.	lbs.	
1200	125	
1250	124	9
1300	133	9
1350	142	9
1400	152	10
1450	162	10
1500	172 $\frac{1}{2}$	10 $\frac{1}{2}$
1550	184	11 $\frac{1}{2}$
1600	197	13
1650	211	13
1700	226	14
1750	242	15
1800	259	16
		17

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The analogy among the numbers in all these tables is very remarkable and uniform, the same general law obtaining in them all, by means of which, together with our preceding remarks, we may answer many interesting questions relating to this subject, as connected with artillery practice. For example, suppose it were required to determine what would be the resistance of the air against a 24lb. ball, discharged with a velocity of 2000 feet *per* second. By Table III. the ball of 1.965 inch diameter, when moving with 2000 feet velocity, suffered a resistance of 98lbs.; then since the resistances, with the same velocity, are as the surfaces, and the surfaces as the squares of the diameters; also the diameter of a 24-pound ball being 5.6 inches, we have as $(1.965)^2 : (5.6)^2$, or as $3.86 : 31.36 :: 98\text{lbs.} : 796\text{lbs.}$, the resistance which a 24lb. ball experiences when discharged with the above velocity. And generally, if the diameter of any proposed ball be d inches, and r the tabular resistance corresponding to any velocity v ; then we shall generally

have as $(1.965)^2 : d^2 :: r : \frac{r d^2}{(1.965)^2} = \frac{r d^2}{3.8}$, or very nearly $\frac{1}{4} r d^2$.

These resistances relating to certain and determinate velocities, a principal object of investigation has been, amongst experimentalists, to determine some rule or formula by which the resistance may be found for any velocity whatever, and the result of Dr. Hutton's investigations on this subject is as follows, *viz.*

Resistance = $r = .00002576 v^2 - .00388 v$, in avoirdupois pounds, the velocity being v .

This rule $.00002576 v^2 - .00388 v = r$ denotes the resistance for a ball whose diameter is 1.965 inch, the square of which is 3.9 or 4 nearly. Hence to adapt it to any other ball, whose diameter in inches is d , we shall have, by the same

proportion as above, $\frac{d^2}{3.8} (.00002576 v^2 - .00388 v) =$

$(.00000667 v^2 - .0010) d^2 = (.00000 \frac{2}{3} v^2 - .001 v) d^2$, for the resistance of any ball whose diameter is d , and velocity v .

In smaller velocities the same author finds the theorem $.00001725 v^2 = r$ sufficiently correct, and this is adapted to a ball whose diameter is d in exactly the same manner, giving the result $.00000447 d^2 v^2 = r$ for the resistance when the velocities are small.

For the application of these theorems to the solution of certain problems connected with the doctrine of *projectiles*, see that article: and for various other formulæ and results equally curious and interesting, see Dr. Hutton's *Treatise*, as also vol. iii. of his *Course of Mathematics*; Robins' *Gun-nery*; Moore's *Theory of Rockets*; Gregory's *Mechanics*; and Prony's *Architecture Hydraulique*.

RESISTANCE, Different, of the same Medium to Bodies of different Figures.—Sir Isaac Newton shews, that if a globe and a cylinder, of equal diameters, be moved with equal velocity in a thin medium, consisting of equal particles, disposed at equal distances, according to the direction of the axis of the cylinder; the resistance of the globe will be less by half than that of the cylinder.

RESISTANCE, Solid of the leaf.—From the last proposition the same author deduces the figure of a solid which shall have the least resistance of any containing the same quantity of matter and surface.

The figure is this. Suppose $D N F G$ (*Plate XXXVI. Mechanics, fig. 15.*) to be such a curve, as that if from any point N be let fall a perpendicular $N M$ to the axis $A B$; and from a given point G be drawn a right line $G R$ pa-

rallel to a tangent to the figure in N , and cut the axis, when continued, in R ; $M N$ be to $G R$ as $G R$ *cube*. to $4 B R \times G B q$; a solid described by the revolution of this figure about its axis $A B$, moving in a medium from A towards B , is less resisted than any other circular solid of the same area, &c.

This theorem, which Sir Isaac Newton has given without a demonstration, has been demonstrated by several mathematicians, as Fatio, Craig, M. d'Hospital, Bernoulli, &c. (See Dr. Horfley's edition of Newton, vol. ii. p. 390, and Maclaurin's *Fluxions*, sect. 606 and 607.) For a more particular investigation of this solid, see prob. 6. under the article **ISOPERIMETRY**.

RESISTANCE of a Globe perfectly hard, and in a medium whose particles are so too, is to the force with which the whole motion may either be destroyed, or generated, which it has at the time when it has described four-thirds of its diameter, as the density of the medium to the density of the globe. Hence, also, Sir Isaac Newton infers, that the resistance of a globe is, *ceteris paribus*, in a duplicate ratio of its velocity. Or its resistance is, *ceteris paribus*, in a duplicate ratio of its diameter; or, *ceteris paribus*, as the density of the medium. Lastly, that the actual resistance of a globe is in a ratio compounded of the duplicate ratio of the velocity, and of the duplicate ratio of the diameter, and of the ratio of the density of the medium.

In these articles the medium is supposed to be discontinuous, as air probably is: if the medium be continuous, as water, mercury, &c. where the globe does not strike immediately on all the particles of the fluid generating the resistance, but only on those next it, and those again on others, &c. the resistance will be less by half: and a globe in such a medium undergoes a resistance which is to the force with which the whole motion it has after describing eight-thirds of its diameter, might be generated, or taken away, as the density of the medium to the density of the globe.

RESISTANCE of a Cylinder, moving in the direction of its axis, is not altered by any augmentation or diminution of its length; and therefore is the same with that of a circle of the same diameter, moving with the same velocity in a right line perpendicular to its plane.

The resistance of a cylinder, moving in an infinite non-elastic fluid, arising from the magnitude of a transverse section, is to the force with which its whole motion, while it describes four times its length, may be taken away, or generated, as the density of the medium to that of the cylinder, very nearly.

Hence, the resistance of cylinders moving lengthwise, in infinitely continued mediums, are in a ratio compounded of the duplicate ratio of their diameters, the duplicate ratio of their velocities, and ratio of the density of mediums.

The resistance of a globe, in an infinite non-elastic medium, is to the force by which its whole motion, while it describes eight-thirds of its diameter, might be either generated or taken away, as the density of the fluid to the density of the globe, *quam proximè*.

RESISTANCE of Matter. (See **MATTER**.) The meaning of this expression is not, that matter makes any *opposition* to a change of its state, or exerts a force to maintain itself in the state it is, as some have very improperly expressed themselves. This would imply that activity which is inconsistent with its nature; and if it were true, a part of the force of every impulse would be spent merely in overcoming this opposition, without producing any other effect; and, therefore, the sum of the motions the same way would always be greater before than after collision, which is impossible. The *largest* body will be moved by any *slightest*

lightest impulse of the *smallest*; but then it can be moved only in proportion to the force of the impulse, and this is what is chiefly meant by the *resistance* of matter: *e. gr.* a body at rest will *resist* another which is moving towards it; that is, it will be an *obstruction* to the motion of this other; the latter will be retarded by the former, and will lose just as much motion as it communicates. In other words; the resistance of matter is that in its nature which makes it require an *adequate foreign cause* of every change of state, or from whence it is *volubly passive*, and incapable of receiving any motion from impulse, that is not in a certain fixed proportion to the *relative momentum* of the impelling body, and strictly equal to the change of state it suffers in consequence of the impulse. In this proportion matter is always moved *without difficulty*; but beyond this there is not only a *difficulty*, but an *impossibility* of moving it; and whatever motion it can be supposed to receive from any impulse that is greater than that which the impelling body loses, it must derive from nothing at all. The activity which is denied to matter, is a power of changing its own state, not that of acting upon other matter by *impulse*. This sort of activity, or power, follows from, and is necessarily implied in its perfect passiveness or inertia. See Price's Dissertations, p. 35, note.

Non-RESISTANCE, in *Politics*. See *PASSIVE Obedience*.

RESITU, in *Geography*, a town of Naples, in the province of Capitanata; 16 miles N.N.W. of Vieste.

RESLEU, a river which rises in Bavaria, and runs into the Egra, in Bohemia.

RESOLIF, a town of Scotland, in the county of Cromarty; 7 miles W. of Cromarty.

RESOLVENTS, RESOLVENTIA, in the *Materia Medica*, remedies proper to resolve and dissipate tumours and gatherings; to soften indurations, and, by their tenuity and warmth, evacuate redundant or peccant humours through the pores.

Under this class come various unguents, emplasters, &c.

RESOLUTION, RESOLUTIO, or *Solutio*, in *Physics*, the reduction of a body into its original or natural state, by a dissolution or the separation of its aggregated parts.

Thus snow and ice are said to be resolved into water; and a compound is resolved into its ingredients, &c.: water resolves into vapour by heat; and vapour is again resolved into water by cold.

Some of the modern philosophers, particularly Mr. Boyle, M. Mariotte, Boerhaave, &c. maintain that the natural state of water is to be congealed, or in ice; inasmuch as a certain degree of heat, which is a foreign and violent agent, is required to make it fluid: so that near the pole, where this foreign force is wanting, it constantly retains its fixed or icy state. On this principle, the resolution of ice into water must be allowed an improper expression.

RESOLUTION, in *Chemistry*, is the reduction of a mass, or mixed body, into its component parts, or first principles, by proper analysis.

The resolution of bodies is performed variously; by distillation, sublimation, dissolution, fermentation, &c. See each operation under its proper article. See also *DISSOLUTION* and *SOLUTION*.

RESOLUTION, in *Ethics*, is that passion which encounters difficulties and dangers; but when it has to do more peculiarly with dangers, it is called boldness. Desire, joy, and sorrow, enter into its constitution; but joy is much the principal ingredient. When resolution degenerates into a concern to maintain our mistakes, humours, or vices, it is more properly denominated obstinacy. See *PASSIONS*.

RESOLUTION, in *Logic*, is a branch of *method*, called also *analysis*.

The business of resolution is to investigate or examine the truth or falsehood of a proposition, by ascending from some particular known truth, as a principle, by a chain of consequences, to another more general one in question. Resolution, or the analytic method, stands in direct opposition to *composition*, or the synthetic method; in which last we descend from some general known truths to a particular one in question.

For an instance of the method of resolution; suppose the question this: Whether, on the supposition of man's existence, we can prove that God exists?

To resolve this, our method is thus: Mankind did not always exist. It is evident, from a thousand considerations, the species had a beginning; and that, according to all history, not six thousand years ago; but if it had a beginning, there must be some cause of its beginning; something to induce it to exist then more than it did before; in effect, there must be a cause or author of its existence; for from nothing, nothing arises: this cause, whatever it is, must, at least, have all the faculties we find in ourselves; for none can give more than he has: nay, he must have others, which we have not, since he could do what we cannot do, *i. e.* create, make man exist, &c. Now, this cause either exists still, or has ceased to do so: if the former, he did not exist from eternity; for what is from eternity is necessary, and can neither by itself, nor any other cause, be reduced to nothing: if the latter, it must have been produced from some other; and then the same question will return upon the producer. There is then some first cause, and this cause has all the properties and faculties we have; nay more, has existed from eternity, &c. Therefore, from the supposition of man's existence, it follows that there is a God.

RESOLUTION, or *Solution*, in *Mathematics*, is an orderly enumeration of several things to be done, to obtain what is required in a problem.

Wolfius makes a problem to consist of three parts. The *proposition* (which is what we properly call the *problem*), the *resolution*, and the *demonstration*.

The general tenor of all problems is, those things being done which are enjoined by the resolution, the thing is done which was to be done.

As soon as a problem is demonstrated, it is converted into a theorem; of which the resolution is the hypothesis; and the proposition the thesis.

The process of a mathematical resolution, see in the following article.

RESOLUTION, in *Algebra*, or *algebraical*, is of two kinds; the one practised in numerical problems, the other in geometrical ones.

RESOLUTION of *Equations*, is the determination of the values of the unknown letters or quantities of which it is composed; in order to which it is necessary, first, to exterminate or eliminate all the unknown quantities but one out of the equation, and then the value of the remaining quantity is to be found by the proper rules for this purpose, *viz.* by the rules given for *simple, quadratic, cubic, or biquadratic equations*, according to which of these it may belong; or, by the general method of *approximation*, for which see the respective articles. But as all these cases have reference only to one unknown quantity, it will not be amiss, in this place, to explain some of those methods which are most commonly employed for reducing equations to one unknown.

First, it may be observed, that in any determinate problem there are always as many equations independent of each other, as there are unknown quantities; if there are not so many, the question is *indeterminate*, and if there be more, it is *impossible*.

RESOLUTION OF EQUATIONS.

We cannot, in a limited article like the present, give all the methods that may be employed for exterminating the unknown letters; these being extremely various, and depending much upon the practice and proficiency of the analyst himself, and the manner in which those quantities are involved; but the most applicable and general methods are the three following, *viz.*

1. Find the value of one and the same unknown quantity in each equation, and put all these values equal to each other, which will eliminate one of the quantities, and reduce the number of equations to one less. Then do the same in these new equations; and again in the last; and so on, till there be but one equation and one unknown quantity, the value of which must be found by the proper rules, as above referred to.

2. Find the value of one of the unknown quantities in one of the equations, in terms of the other quantities; then substitute this value for that quantity in all the other equations; again, find the value of one of the remaining quantities, and substitute its value as before; and so on, till there remains but one equation and one unknown quantity, whose value is to be found as before.

3. Multiply each of the equations by such numbers as will render the co-efficients of one of the letters the same in all; then, by adding or subtracting these equations according as the equal co-efficients have unlike or like signs, the quantity whose co-efficients were equal will disappear; which being repeated again upon the remaining quantities, there will ultimately be found only one equation and one unknown quantity. And it may be proper to observe, that in all these cases, if any of the unknown quantities have fractional co-efficients, the whole equation in which they are found should be multiplied by such a number as will convert these fractions into integers.

Thus, in the equations

$$\begin{aligned} \frac{3}{5}x + \frac{2}{15}y &= 10 \\ \frac{1}{5}x + 3y &= 95 \end{aligned}$$

multiply the first by 15, and the latter by 2, gives

$$\begin{aligned} 9x + 2y &= 150 \\ x + 6y &= 190 \end{aligned}$$

the solution of which, by each of the preceding rules, will be as follows.

Or, putting letters instead of the above numerical co-efficients, in order to render the solution more general, let there be given

$$\begin{aligned} ax + by &= c \\ dx + ey &= f \end{aligned} \text{ to find } x \text{ and } y.$$

1st method. $\begin{cases} ax = c - by \\ dx = f - ey \end{cases}$ by transposition.

$$x = \frac{c - by}{a} = \frac{f - ey}{d} \text{ by division.}$$

$dc - dby = af - aey$, by multiplication.

$$(ae - db)y = af - dc$$

$$y = \frac{af - dc}{ae - db}$$

And in the same manner we find,

$$x = \frac{ec - bf}{ae - db}$$

2d method. $\begin{cases} ax + by = c \\ dx + ey = f \end{cases}$ to find x and y .

$$x = \frac{c - by}{d} \text{ as above.}$$

$$\frac{dc - dby}{a} + ey = f, \text{ by substit.}$$

$dc - dby + aey = af$, by multiplication.

$$(ae - db)y = af - dc$$

$$y = \frac{af - dc}{ae - db} \text{ as before.}$$

$$x = \frac{ec - bf}{ae - db}$$

3d method. $\begin{cases} ax + by = c \\ dx + ey = f \end{cases}$ to find x and y .

$$dax + dby = dc, \text{ mult. by } d.$$

$$adx + acy = af, \text{ mult. by } a.$$

$$(db - ac)y = dc - af$$

$$\begin{aligned} y &= \frac{dc - af}{db - ac} = \frac{af - dc}{ae - db} \\ x &= \frac{bf - ec}{db - ac} = \frac{ec - bf}{ae - db} \end{aligned} \text{ as before.}$$

This will, in some measure, illustrate the preceding rules, which we shall not insist upon any further; but, in the following examples, shall avail ourselves of any advantages that the equations present, in order to arrive at the solution in the easiest manner possible.

Examples.

1. Given $\begin{cases} x^2 + y^2 = a \\ xy = b \end{cases}$ to find x and y .

$$\begin{aligned} x^2 + y^2 &= a \\ 2xy &= 2b, \text{ doubling the 2d.} \end{aligned}$$

$$x^2 + 2xy + y^2 = a + 2b, \text{ by addition.}$$

$$x^2 - 2xy + y^2 = a - 2b, \text{ by subitit.}$$

$$\begin{aligned} x + y &= \sqrt{a + 2b} \\ x - y &= \sqrt{a - 2b} \end{aligned} \text{ by extraction.}$$

$$x = \frac{\sqrt{a + 2b} + \sqrt{a - 2b}}{2}$$

$$y = \frac{\sqrt{a + 2b} - (a - 2b)}{2}$$

2. Given $\begin{cases} x + y = a \\ xy = b \end{cases}$ to find x and y .

$$x^2 + 2xy + y^2 = a^2, \text{ by squaring.}$$

$$4xy = 4b, \text{ mult. by } 4.$$

$$x^2 - 2xy + y^2 = a^2 - 4b, \text{ by subitit.}$$

$$x - y = \sqrt{a^2 - 4b}, \text{ by extract.}$$

$$x + y = a, \text{ 1st equat.}$$

$$x = \frac{a + \sqrt{a^2 - 4b}}{2}$$

$$y = \frac{a - \sqrt{a^2 - 4b}}{2}$$

3. Given $\begin{cases} x - y = a \\ xy = b \end{cases}$ to find x and y .

$$x^2 - 2xy + y^2 = a^2, \text{ squaring.}$$

$$4xy = 4b, \text{ mult. by } 4.$$

$$x^2 + 2xy + y^2 = a^2 + 4b, \text{ by adding.}$$

$$x + y = \sqrt{a^2 + 4b}, \text{ by extract.}$$

$$x - y = a$$

$$x = \frac{a + \sqrt{a^2 + 4b}}{2}$$

$$y = \frac{a - \sqrt{a^2 + 4b}}{2}$$

4. Given

RESOLUTION OF EQUATIONS.

4. Given $x - y = a$
 $x^2 + y^2 = b$ } to find x and y .
 $x^2 - 2xy + y^2 = a^2$, squaring.
 $2x^2 + 2y^2 = 2b$, doubling.
 $x^2 + 2xy + y^2 = 2b - a^2$, subtr.
 $x + y = \sqrt{2b - a^2}$
 $x - y = a$

$$x = \frac{a + \sqrt{2b - a^2}}{2}$$

$$y = \frac{a - \sqrt{2b - a^2}}{2}$$

This method of resolution will apply in many problems, and sometimes saves considerable labour.

5. Given $x^2 + xy = a$
 $y^2 + xy = b$ } to find x and y .
 $x^2 + 2xy + y^2 = a + b$, by adding.
 $x + y = \sqrt{a + b}$, by extract.
 $(x + y)x = x\sqrt{a + b} = a$
 $(x + y)y = y\sqrt{a + b} = b$

$$x = \frac{a}{\sqrt{a + b}}, \text{ and } y = \frac{b}{\sqrt{a + b}}.$$

6. Find three numbers in arithmetical progression, whose sum is a , and sum of their squares b .

Let $x - y$, x and $x + y$, be the numbers required.

Then $x - y + x + x + y = 3x = a$
 $(x - y)^2 + x^2 + (x + y)^2 = 3x^2 + 2y^2 = b$

$$x^2 = \frac{a^2}{9} = \frac{b - 2y^2}{3}$$

Whence $a^2 = 3b - 6y^2$

and $y = \sqrt{\frac{3b - a^2}{6}}$, and $x = \frac{a}{3}$.

And a similar substitution, *viz.* one which answers one of the conditions of the question, may frequently be employed to great advantage.

7. Sometimes it will be convenient to substitute for the sums and differences of numbers, as in the following example.

Given $x + y = a$
 $x^2 + y^2 = b$ } to find x and y .

Let $x + y = 2m$
 and $x - y = 2n$ } then $\begin{cases} x = m + n \\ y = m - n \end{cases}$

$$(m + n)^2 + (m - n)^2 = b,$$

$$\text{or } 2m^2 + 12m^2n^2 + 2n^2 = b;$$

but $2m = a$, or $m = \frac{a}{2}$; therefore m is known, and the above becomes

$$2n^2 + 12m^2n^2 = b - 2m^2$$

$$n^2 + 6m^2n^2 = \frac{1}{2}b - m^2$$

$$n^2 = -3m^2 \pm \sqrt{\left(\frac{1}{2}b + 8m^4\right)}$$

$$\text{and } n = \left[3m^2 \pm \sqrt{\left(\frac{1}{2}b + 8m^4\right)}\right]^{\frac{1}{2}}.$$

Whence m and n being known, x and y are also known; for $x = m + n$, and $y = m - n$.

8. Sometimes it is advantageous to consider one of the quantities as an unknown multiple of the other; thus:

Given $xy = x^2 - y^2 = x^3 + y^3$, to find x and y .

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Make $y = zx$, then these become

$$zx^2 = x^2 - z^2x^2$$

$$zx^2 = x^2 + z^3x^3$$

$$z = 1 - z^2, \text{ from the first,}$$

$$z^2 + z = 1, \text{ or } z = -\frac{1}{2} + \frac{1}{2}\sqrt{5};$$

whence z is a known quantity. Now,

$$z = x + z^3x, \text{ from the second,}$$

$$x = \begin{cases} \frac{z}{1 + z^3} = \frac{-\frac{1}{2} + \frac{1}{2}\sqrt{5}}{1 - \left(\frac{1}{2} - \frac{1}{2}\sqrt{5}\right)^3} \\ \frac{-\frac{1}{2} + \frac{1}{2}\sqrt{5}}{-1 + \sqrt{5}} = \frac{1}{2} \end{cases}$$

$$y = zx = -\frac{1}{4} + \frac{1}{4}\sqrt{5}, \text{ as required.}$$

Sometimes it saves considerable labour, to find the sum, product, or difference, of the two quantities, instead of the quantities themselves; thus:

9. Given $x^2 + y^2 - x - y = a$

$$xy + x + y = b;$$

by addition $x^2 + xy + y^2 = a + b$

$$x^2 + 2xy + y^2 = a + b + xy$$

$$x + y = \sqrt{a + b + xy};$$

but $x + y = b - xy;$

therefore $b^2 - 2bxy + x^2y^2 = a + b + xy$

$$x^2y^2 - (2b + 1)xy = a + b - b^2;$$

whence $xy = \frac{2b + 1}{2} \pm \sqrt{\left(\frac{2b + 1}{2}\right)^2 + a + b - b^2}.$

Now make $xy = p$ a known quantity, and we have, from the second equation,

$$\begin{aligned} p + x + y &= b, \\ \text{or } x + y &= b - p \\ x y &= p \end{aligned}$$

whence $x^2 - 2xy + y^2 = (b - p)^2 - 4p$

$$x - y = \sqrt{[(b - p)^2 - 4p]}$$

$$x + y = b - p$$

therefore $x = \frac{b - p + \sqrt{[(b - p)^2 - 4p]}}{2}$

$$y = \frac{b - p - \sqrt{[(b - p)^2 - 4p]}}{2}.$$

These, and a variety of other artifices peculiar to certain equations, will occur to the practical analyst; of which, numerous examples may be seen in Bland's Algebraical Problems, as also in Bonnycastle's and Euler's Algebra.

RESOLUTION OF a geometrical Problem algebraically. The process in the former article is to be observed throughout; but as it rarely happens we come at an equation in geometrical problems by the same means as in numerical ones, there are some farther things to be noted: 1st, then, suppose the thing done, which was proposed to be done. 2. Examine the relations of all the lines in the diagram, without any regard to known or unknown, in order to find which depends on which; and from which being had, what others are had, whether by similar triangles, or rectangles, &c. 3. To obtain the similar triangles or rectangles, the lines are to be frequently produced, till they become either directly or indirectly equal to given ones, or intersect others, &c. Parallels and perpendiculars to be frequently drawn; points to be frequently connected; and angles to be made equal to others. If thus you do not arrive at a neat equation, examine the relation of the lines in another manner.

F

Sometimes

Sometimes it is not enough to seek the thing directly, but another thing must be sought, whence the first may be found.

The equation being reduced, the geometrical construction is to be deduced from it, which is done in various manners, in the various kinds of equations. See APPLICATION of *Algebra to Geometry*.

RESOLUTION, *Problematical*. See PROBLEMATICAL.

RESOLUTION, in *Medicine*, the termination of an inflammation, without any change in the texture of the part inflamed, in contradistinction to the termination in suppuration or gangrene. The great object of medicine, in all inflammatory diseases, in the commencement, is to obtain the resolution of the inflammation, so that the structure and functions of the part affected may not be injured by the disease: and the means of obtaining a resolution, when the inflammation is seated in an internal part, are evacuations of blood by the lancet, cupping, or leeches; and of serum, by purging the bowels, applying blisters in the vicinity, &c.; and when the inflammation is external, by local evacuations by similar means, and by the application of cold substances. See INFLAMMATION.

RESOLUTION, in *Music*, is when a canon or perpetual fugue is not written all on the same line, or in one part; but all the voices that are to follow the guida, or first voice, are written separately, either in score, *i. e.* in separate lines, or separate parts, with the pauses each is to observe, in the beginning, and in the tone proper to each.

The resolution of discords, in music, is generally by their descent upon concords; except the *tritonus*, or sharp 4th, and the *note sensible*, or sharp 7th of a key, which ascend, while the base descends or remains stationary.

RESOLUTION, in *Surgery*, the most favourable manner in which the process of inflammation can terminate, consisting of a gradual abatement of the pain, redness, swelling, throbbing, and heat of the part, without any formation of matter, and without any sloughing. Also, the dispersion of swellings and indurations, through the medium of absorption.

RESOLUTION of *Motion*, in *Mechanics*. See MOTION.

RESOLUTION *Bay*, in *Geography*, a name given by captain Cook to the port of *Madré de Dios*, situated near the middle of the W. side of *St. Christina*, one of the *Marquesas* islands, in the South Pacific ocean, and under the highest land in the island, in S. lat. $9^{\circ} 55' 30''$, W. long. $139^{\circ} 8' 40''$, and N. 15° W. from the W. end of *La Dominica*. The fourth point of the bay is a steep rock of considerable height, terminating at the top in a peaked hill, above which may be seen a path-way leading up a narrow ridge to the summit of the hills. The north point is not so high, and rises with a more gentle slope. They are a mile from each other in the direction of N. by E., and S. by W. In the bay, which is near three quarters of a mile deep, and has from 34 to 12 fathoms water, with a clean sandy bottom, are two sandy coves, divided from each other by a rocky point. In each is a rivulet of excellent water. The northern cove is the most commodious for wooding and watering. Here is the little water-fall mentioned by *Quiros*, *Mendana's* pilot; but the town, or village, is in the other cove. There are several other coves or bays on this side of the island; and some of them, especially to the northward, may be mistaken for this: therefore the best direction is the bearing of the west end of *La Dominica*. *Cook's Voyage*, vol. i. p. 307.

RESOLUTION *Island*, one of the newly-discovered Society islands, in the South Pacific ocean. S. lat. $17^{\circ} 24'$. W. long. $141^{\circ} 15'$.—Also, an island in the North Atlantic ocean, 60 miles in circumference, situated on the N. side of

the entrance into *Hudson's* straits. N. lat. $61^{\circ} 40'$. W. long. 65° .

RESOLUTION *Port*, a bay or harbour of the island of *Tanna*, in the South Pacific ocean. S. lat. $19^{\circ} 32'$. E. long. $169^{\circ} 40'$.

RESONANCE, in *Music*, is sounding again, repeating or continuing the sound. The resonance of a string, a bell, or other sonorous body, ceases with the vibration.

It expresses the sound returned by the air inclosed in the bodies of stringed musical instruments, as lutes, &c.; or even in the bodies of wind instruments, as flutes, &c.

Elliptic and parabolic vaults resound strongly, *i. e.* they strongly reflect or return the sound. See ECHO.

The mouth, and the parts thereof, as the palate, tongue, teeth, nose, and lips, *Monf. Dodart* observes, contribute nothing to the tone of the voice; but their effect is very great as to the resonance.

Of this we have a very sensible instance in that vulgar instrument called *Jews-harp*, or *trompe de Bearn*: for if you hold it in your hand, and strike the tongue or spring thereof, which yields all the sound of the instrument, it scarcely makes any noise at all; but, holding the body of the instrument between the teeth, and striking the spring as before, it makes a musical buzz, which is heard to a good distance, and especially in the lower notes.

So also in the hautboys, the tone of the reed is always the same; being a sort of drone: the chief variety is in the tone of the resonance, produced in the mouth by the greater or less aperture, and the divers motions of the lips.

RESORT. See RESSORT.

RESOUZE, in *Geography*, a river of France, which runs into the *Saone*, near *Pont de Vaux*, in the department of the *Ain*.

RESP, a disease in sheep, the same as red-water. See RED-Water.

RESPECT, in *Ethics*, denotes that favourable impression which the goodness of a character has made upon the person contemplating it, united with a share of good sense. An union of both these qualities is necessary to create respect. Goodness alone is not sufficient to produce it; for if it be seated in a mind that indicates extreme imbecility, it cannot be deemed respectable. On the other hand, superior sense in a mind destitute of goodness, will not inspire respect: it will either waste itself in idle speculations, which renders it indifferent to us; or it may degenerate into low cunning, which renders it hateful. Should it be connected with power in a wicked and perverse mind, it will excite horror and dismay, which are very remote from respect.

RESPECTU *computi vicecomitis habendo*, in *Laro*, a writ for the respiting of a sheriff's account, upon just occasion, directed to the treasurer and barons of the exchequer.

RESPECTUANDO HOMAGIO. See HOMAGIO.

RESPIRATION, in *Physiology*, that function of animal bodies, in which the air, either in its elastic state, as it constitutes the atmosphere, or held in solution in water, is brought into contact with some organ or organs, undergoing alterations in its own constitution, and producing changes in the nature of the animal fluids, which are essential to the continuance of life. In the mammalia, birds, and reptiles, the respiratory organs consist of lungs, that is, of membranous cavities, differently constructed in the three classes, but agreeing in the circumstance of alternately receiving and emitting a portion of atmospheric air. This alternate ingress and egress of air constitutes properly what is called in common language *breathing*, to which the philosophical term *respiration* is synonymous. We extend the term to animals of the lower classes, which have no lungs, and some

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of which do not even *breathe*, that is, do not receive and emit air at all. In consequence of the medium in which fishes are immersed, they cannot take in the atmospheric air in its elastic state, and they consequently have an apparatus, altogether different from that which exists in the three classes already named, for the purpose of producing analogous effects in their economy. They are furnished with a passage communicating with the fauces or œsophagus, and terminating in the external surface of the body, through which a part of the water received into the mouth is forcibly propelled. In this passage, the branchiæ or gills are situated; and the blood, which circulates in their fringed extremities, is thus exposed to the action of a quantity of air, which the water always holds in solution. Crustaceous animals, and many of the mollusca, have organs more or less similar in structure and functions to the gills of fishes. Insects, both in their larva and perfect states, possess numerous ramified tubes, distributed over their whole body, and provided with open mouths, which admit the passage to and fro of the external air. Although the structure of the organs in fishes and insects is so different from that which we find in mammalia, birds, and reptiles, they perform an analogous office, answer the same general purposes in the animal economy, and are considered equally in the light of organs of *respiration*; this term being employed now to denote the general effect produced by these various organizations, without any reference to the means through which it is produced; although it was originally applied to the passage of the air to and from the lungs, when the results of that process were unknown.

Is respiration, considered in its most extensive sense, a function necessary to the existence of all animals? The results of all the investigations hitherto made, induce us to answer this question in the affirmative; but the point is not yet demonstrated in all cases.

In Cuvier's class of zoophytes, excepting the echinodermata, no respiratory apparatus has been found; nor has any been yet discovered in the intestinal worms, or in some of the external worms, as the leech, earth-worm, and others. It may be doubted, since the analogy on which we ground our opinion of the necessity of air to animal existence is so very strong, whether the apparent exception afforded by the animals just enumerated may not arise from our imperfect knowledge of their organization, and whether more accurate inquiries may not either disclose to us in these cases some particular organ of respiration, or shew us that the function is performed by the external surface of the body in general. We know, in fact, by direct experiment, that some of these animals produce changes in the air, and cannot live when debarred from its access.

The differences which animals exhibit in their mode of breathing, or in the manner of effecting the changes which their nutritive fluid undergoes from the action of the atmosphere, depend on other circumstances in their organization. Vegetables, and animals which have no circulation, *respire* by their whole surface, or by means of vessels, which convey air to all points of their interior. Those only which have a true circulation breathe by a particular organ. The heart being in them a common point of departure and return for the blood, the vessels containing that fluid could easily be so arranged as to convey it to the lungs, after it had circulated through the body: this was obviously impracticable in instances, when the nutritive fluid is every where uniformly expanded, without being contained in vessels. Hence respiration by lungs or gills is a function dependent on that of circulation, and may be regarded as a remote consequence of those faculties which characterize animals.

Respiration presents to our observation two very different kinds of phenomena: 1st, the motions of the lungs, gills, or other instruments of breathing, or of parts connected with them, by which the former are alternately dilated and contracted for the admission and expulsion of air, and the latter are exposed to a current of water; and 2dly, the changes produced in the blood or other animal fluids, and in the air or water, in consequence of their mutual exposure in these organs. The first may be termed the *mechanical*, and the second the *chemical* phenomena of respiration. The former, including all the modifications which breathing undergoes in laughing, crying, and sighing, in coughing, sneezing, hiccoughing, in straining or holding the breath, &c. have been fully considered under the article LUNG; in which the anatomy of the organs of respiration in man is also fully detailed. In the articles MAMMALIA, BIRDS, FISHES, REPTILES, INSECTS, and VERMES, the breathing organs, and their mechanical phenomena in animals, are considered. The chemical phenomena are the object of the present article.

The functions of the respiratory organs are closely connected with the other great processes of the animal economy. The heart, brain, and lungs, more particularly influence each other, and present, in their mutual relations, numerous and highly interesting considerations for the physiologist. On these points we refer to HEART, LUNGS, and NERVOUS System.

In the following article we shall speak, 1st, of the quantity of air received into the chest; 2dly, of the changes which this undergoes in breathing, as they have been made out by researches on the respiration of man and the mammalia; 3dly, of the changes produced in the blood; 4thly, of the various explanations of the mode in which these changes are produced; 5thly, of the respiration of the different gases; 6thly, of the chemical phenomena of respiration in other animals, and 7thly, of animal heat.

I. *Number of Respirations, and Quantity of Air respired.*—“It appears,” says Dr. Thomson (*System of Chemistry*, v. 5. p. 732.), “that the number of respirations made in a given time differs considerably in different men. Dr. Hales reckons them at 20 in a minute. A man, on whom Dr. Menzies made experiments, breathed only 14 times in a minute. Mr. Davy informs us that he breathes between 26 and 27 times in a minute. I myself make about 19 respirations at an average. The average of all is 20. Now 20 in a minute make 28,800 in 24 hours.”

In his “Inquiry,” p. 102, et seq. Mr. Ellis has brought together, from the most authentic sources, a statement of the facts hitherto collected concerning the quantity of air ordinarily inspired. To ascertain this point, many modes of experiment have been adopted, and the conclusions which have been drawn from them very widely differ. Borelli estimated the bulk of air taken in at a single inspiration at 15 cubic inches (de Mot. Animal.); Mr. Kite from 12 to 17 (Essay on Apparent Death, p. 24.); Dr. Goodwyn at 14 (Connection of Life with Respiration, p. 28, et seq.); Mr. Davy from 13 to 17 (Researches, p. 410 and 433.); and Drs. Jurine, Hales, Haller, and Sauvages, at 40 cubic inches. With the conclusion of these latter authors the experiments of Dr. Menzies nearly coincide, and as the methods which he adopted seem less liable to objection than those of any other author, it may not be improper shortly to give the detail of them. He procured an allantoid, and fixed to it a machine consisting of two pretty large tubes, joined at right angles, nearly in the form of a common brass cock. One end of the horizontal tube was connected with the allantoid, and the other received into the mouth, while the upright tube, which rose from its centre, communicated

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with the atmosphere. The tubes were large, and valves, made out of an allantoid, were affixed to the end of the upright tube, and to that attached to the allantoid, so that the air, when expelled from the lungs, should not escape into the atmosphere, nor return from the allantoid, after having once entered it. Precautions were taken also, by covering the mouth and nostrils, to prevent any air from passing in or out of the lungs, except by the tubes above mentioned. Things being thus prepared, he began to respire, and did not remove his mouth from the tube till he had filled the allantoid, taking care to stop his nostrils during expiration. The allantoid was filled, in repeated trials, by about 56 expirations, as natural as possible; and as its capacity was 2400 cubic inches, the average bulk of air thrown out of the lungs by each expiration, was 42.8 cubic inches. He then fixed another allantoid, whose capacity had been previously ascertained, to the end of the upright tube; and having filled it with atmospheric air, he inspired the air from one allantoid and expired it into the other, and the quantities were found to be nearly the same. Several persons of the middle size repeated this experiment with nearly the same result; the difference being scarcely ever more than one or two cubic inches. By another mode of experiment, first proposed by Boerhaave, of plunging a man into a tub of water up to his chin, and judging of the dilatation of the lungs from the ascent and descent of the water, he obtained, by several trials, nearly the same results; and when these same men were made to breathe from and into the allantoids, in the manner above described, the correspondence by the two methods was almost complete. (Menzies on Respiration, p. 21, et seq.) As there seems no obvious source of inaccuracy in the processes here employed, and their results so remarkably coincide; and as they present the average bulk deduced from 56 respirations, we may conclude, says Dr. Boistock, that 40 cubic inches is the quantity of air employed in an ordinary act of respiration. Essay on Respiration, p. 34. Inquiry into the Changes, &c. § 85.

Messrs. Allen and Pepys endeavoured to determine the quantity of air received into the lungs in an ordinary inspiration: 3460 cubic inches of atmospheric air were passed through the lungs in 11 minutes, by 58 respirations. As, on ordinary occasions, the person breathed 19 times in a minute, it is inferred that, by multiplying the time consumed in the experiment by the number of natural respirations in a minute, and dividing the whole bulk of air by the product, we obtain the true bulk of air received into the lungs at each natural inspiration; thus $11 \times 19 = 209$; and $\frac{3460}{209} = 16.5$ cubic inches, the quantity of a single natural inspiration. (Phil. Transf. 1808, p. 256.) Mr. Ellis justly observes, that not only do the efforts of the mind, and the operations of the apparatus, interfere greatly with the natural actions of the respiratory organs, but the gross quantity of air received in 58 preternatural inspirations can never with justice be assumed as a true measure of the quantity breathed in 209 natural respirations. The experiments of Dr. Menzies therefore still seem the most unexceptionable on this subject.

The difficulty in arriving, by experiment, at certain conclusions respecting the volume of air taken into the lungs in each inspiration, may arise from a difference in the state or capacity of those organs in different individuals; from the relative vigour or debility of the muscular powers carrying on the respiratory function; from the circumstances in which the animal is placed; the composition of the air itself; or the manner in which it is breathed. In many modes of experiment also, the friction between the

air and apparatus employed, or the resistance which this latter may create to the ordinary process, will greatly vary the result: and considerable errors must likewise have arisen from the variation in bulk, occasioned by the change of temperature, which the air, during its respiration, suffers; from the difficulty of breathing in a natural manner when the mind is directing that process; and from the embarrassments opposed to the natural action of the respiratory organs by the contrivances adapted to them.

It will not be denied, that the size and capacity of the chest must, in a certain degree, regulate the quantity of air which is taken into, or expelled from it; and since respiration is neither wholly a voluntary nor an involuntary act, but, within certain limits, partakes of the nature of both, and is carried on by the exertion of muscular powers, the bulk of respired air must vary also, either from an alteration in the action of these powers, or from a change in the will of the agent who exerts them. This may be illustrated by considering the different quantities of air taken into the lungs in different states of natural and forced respiration. Dr. Goodwyn, supposing a person at death to make a complete expiration, endeavoured to ascertain the bulk of air then remaining in the lungs, which he estimated at 109 cubic inches. (Connection of Life with Respiration, p. 27.) This estimate he formed by measuring the capacity of the chest, in subjects who had died a natural death by disease, previous to which the expiratory powers must have been much weakened, and unable, in consequence, to expel so much air as when in a state of health and vigour; and in such cases, therefore, expiration might be final without being complete. Mr. Cruickshank observes, accordingly, that the lungs in the dead body, (though expiration is the last action of life,) always retain more air than is given out at several expirations. (On Insensible Perspiration, p. 97.) By a very different mode of experiment, we find Mr. Davy to conclude that his lungs, after a forced expiration, contain only 32 cubic inches of air, when it is reduced to the temperature of 55°, but which, by the heat of the lungs, and saturation with moisture, are increased to 41 cubic inches; and, after a natural expiration, they contained 118 cubic inches (Researches, p. 409, 410.); so that the difference between the two states of natural and forced expiration is 77, which is somewhat more than Dr. Menzies allows, who remarked that many men, after an ordinary expiration, could still expel from their lungs 70 cubic inches of air. (Diff. on Respiration, p. 31.) Mr. Davy adds, that his estimate of 118 cubic inches, as the capacity of the lungs after natural expiration, agrees very well with that of Dr. Goodwyn, who makes it about 109; and, on the supposition that the general debility which precedes the ordinary extinction of life, so weakens the expiratory muscles, as to disable them from making so complete an expulsion of the air, as they can effect when in health and vigour, the agreement is very striking; for nearly the same quantity of air would, in that case, remain in the lungs at the period of natural death, as after that of ordinary expiration.

Messrs. Allen and Pepys found that the healthy lungs of a stout man, five feet ten inches high, contained 108 cubic inches of air after death. Phil. Transf. 1809, p. 410, et seq.

Dr. Boistock conceives, that Dr. Goodwyn's estimate of 109 cubic inches of air remaining in the lungs after complete expiration, is not very remote from the truth; and he objects to Mr. Davy's mode of ascertaining the residual air of the lungs after a forced expiration, from a supposition that the hydrogen gas which he inspired for that purpose was not, in consequence of its low specific gravity, uniformly

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formly diffused through all the cavities of the lungs; and therefore, that the proportions of the gas discharged could furnish no accurate estimate of those which were retained. (Essay, p. 17—25.) But Mr. Dalton has shewn, that hydrogen gas and atmospheric air intermix, when the former is kept in a phial above the latter, and communicating only by the small tube of a tobacco-pipe; and both in a state of rest. (Manchester Memoirs, vol. i. new series.) How much more readily then may this be expected to take place, where the gases are exposed to so large a surface, such great agitation, and increased temperature, as they must have been in the experiments of Mr. Davy. Neither is the small quantity of air, which Mr. Davy assigns, so incompatible, as Dr. Bostock supposes, with the anatomical structure of the thorax; for if we call to mind the space which the heart and the lungs occupy, and recollect, that, under a violent exertion, the chest is made to contract in every direction, and more especially by the ascent of the diaphragm nearly to the fourth or fifth rib, there is no difficulty in imagining the quantity of air in the lungs, in such circumstances, to be nearly that which Mr. Davy's experiments assign.

From a review, therefore, of all the facts and experiments above stated, we venture to draw the following conclusions, as approaching nearest to the truth. First, then, according to Mr. Davy, the lungs contain, after a forced expiration, a bulk of air equal to about 41 cubic inches; and according to the same author and Dr. Goodwyn, they contain, after a natural expiration, from 109 to 118 cubic inches; therefore the state of forced is to that of natural expiration, as 41 to 118. Secondly, according to Dr. Menzies, 40 cubic inches of air are received into the lungs at each ordinary inspiration; therefore the state of natural expiration to that of natural inspiration will be as 118 to 158. Mr. Davy found likewise, that by a forced expiration after a forced inspiration, he could expel from his lungs 190 cubic inches of air, and Dr. Menzies often found it to amount to 200 inches; therefore the state of greatest exhaustion of the lungs is to that of greatest repletion, as 41 to 231. But the 41 cubic inches of air, when inspired at temperature 55°, occupied a bulk equal only to 32; and therefore, by the same rule of proportion, 190 cubic inches, inspired at the same temperature, will be increased to 241.5; consequently, the greatest diminution of the capacity of the chest to its greatest expansion will be as 41 to 241, in the case of Mr. Davy. But these numbers must be considered as indicating proportions only, the absolute quantities being different in different persons. These facts decidedly shew how much the volume of air in the lungs will, at all times, depend on the relative capacity of those organs, on the more or less vigorous state of the expiratory powers, and on the degree of voluntary exertion with which the function may be performed.

The circumstances in which the animal may happen to be placed, will render this variation still more striking. Thus, from the experiments of Mr. Kite (On Apparent Death, p. 27. 29.) and Mr. Coleman (On Suspended Respiration, p. 7, et seq.), we learn, that in the act of drowning, animals are able to expel almost all the air which their lungs contain, by which those organs are brought into a state of collapse. Dr. Goodwyn, on the other hand, found, that in three executed persons, the lungs were expanded almost to their utmost extent, containing 250, 262, and 272 cubic inches of air (Essay, p. 25.); and Mr. Coleman observes, that when, previous to their suspension, he secured the trachea of animals by a ligature at the instant an inspiration was made, in less than four minutes they ceased to struggle, though the whole of the air was confined within the lungs,

and no obstruction to the passage of the blood existed from their collapse (p. 111—138). Dr. Baillie also has often observed the lungs filling the chest, and distended with air and mucus, in persons who have died asthmatic; so that to die and to expire are by no means synonymous terms,—an observation long since made by Mayow, who remarked, that if air be drawn into the lungs, and the mouth and nostrils afterwards closed, “*quamvis inflati maneat pulmones, mori tamen necesse erit, quia non licet expirare.*” (Tractat. Quinque, p. 300.) If indeed we reflect, that during submerision in water no fresh air can enter into the lungs, but that all which they contain may freely escape; and if we consider, that before suspension by the neck in the human subject, a deep inspiration, under the influence of fear, as Dr. Goodwyn observes, is made, and that no air can afterwards pass out, if the cord completely close up the trachea; it is reasonable to expect, that this variation in the bulk of air contained in the lungs should obtain, under the very different circumstances in which respiration is brought to a stand.

How much the composition of the air itself, and the manner in which it is breathed, will vary the bulk of residual air in the lungs, we may collect from the experiments of various authors. Dr. Hales moistened a bladder, and fixed to it a sestet, both of which would contain 74 cubic inches of air. Having blown up the bladder, he put the small end of the sestet into his mouth, and, at the same time, pinched his nostrils close, that no air might escape through them, and he then breathed to and fro the air contained in the bladder. In less than half a minute, he found a considerable difficulty of breathing, and was forced after that to draw his breath very fast; and at the end of the experiment, the suffocating uneasiness was so great as to oblige him to take away the bladder from his mouth. Towards the end of the minute, the bladder was become so flaccid that he could not blow it above half full, with the greatest expiration that he could make. (Statical Essays, vol. i. p. 238.) When also Mr. Davy respired atmospheric air in a natural manner, he took in, he says, only 13 cubic inches and expelled 12.7, so that only about $\frac{1}{3}$ d part of the original bulk was retained; when he made one respiration of 100 cubic inches of air, the diminution was to 99, or $\frac{1}{100}$; when, after a complete exhaustion of his lungs, he respired 141 cubic inches of air, once only for one-fourth of a minute, they were reduced to 139, or $\frac{1}{100}$ th nearly; and when 161 cubic inches were breathed for about a minute, their bulk was diminished to 152, or $\frac{1}{100}$ th (Researches, p. 432—435.);—in every case, the diminution augmenting with the repetition of the respiration, and consequent impurity of the air, and distress of the respiratory organs. So likewise, when Dr. Henderfon breathed from and into the gasometer 600 cubic inches of air for four minutes, they were reduced to 570, or lost $\frac{1}{10}$ th of their bulk; and he adds, that he held on respiring until the sense of oppression about the chest obliged him to desist. (Nicholson's Journal, May 1804.) These distressing symptoms, brought on by the repeated breathing of the same quantity of air, were felt in a still greater degree by Mr. Kite; for on respiring 591 cubic inches of atmospheric air from and into a bladder, he experienced, in one minute, great anxiety at the breast, which in half a minute more became intolerable; his face swelled, became black, and felt excessively hot, and sparks of fire danced before him; loss of sight, giddiness and confusion of the senses succeeded, and at the end of little more than two minutes, he fell back into a chair. He was relieved by fresh air, but remained confused and giddy (Essay on Apparent Death, p. 25.) The amount of the diminution

of respired air, says professor Pfaff, depends not only on the *time* during which a given volume of air is respired, but principally on the magnitude of the volume of air itself; it must be proportionally less the greater the quantity inspired. He breathed 144 cubic inches of air once only in the time of ten or twelve seconds, and the diminution was four cubic inches, or $\frac{1}{36}$ th of the primitive volume; when he respired the same volume of air twice, during twenty seconds, it lost eight cubic inches, or $\frac{1}{18}$ th; and when it was thrice respired, during thirty seconds, the diminution amounted to twelve cubic inches, or $\frac{1}{12}$ th of the primitive volume. (Nicholson's Journal, December 1805.) Now, in all these cases, the volume of air respired was precisely the same, and could not, therefore, affect the ratio of diminution: but as the times were doubled and tripled, so nearly were the degrees of diminution. But the more frequently the same air is breathed, the more unfit does it become for respiration; and to this change of composition, more than to the time, or the magnitude of the volume of air, is the increased degree of diminution to be ascribed.

This will perhaps appear more striking, if we attend to what happens in respiring nitrous oxyd, which is composed of the same elements as atmospheric air, but contains a much larger proportion of oxygen. After exhausting his lungs, Mr. Davy inspired 108 cubic inches of this gas, which, when expired, were reduced to 99, or had lost $\frac{1}{12}$ th of their bulk. When he made two respirations of the same quantity of the oxyd, the diminution was to 95, or about $\frac{1}{12}$ th; and when he respired 102 cubic inches of nitrous oxyd, mixed with $\frac{1}{36}$ th of common air, for half a minute, the volume of air, after the seventh expiration, was reduced to 62, or had suffered a loss equal to $\frac{1}{12}$ th. (Researches, pp. 394. 416.) Hence it appears, that in the natural respiration of atmospheric air, only a small diminution of its bulk takes place: that this diminution increases as the air becomes vitiated by repeated respirations, or is breathed in a preternatural manner: and that when a gas of the same elementary materials, but combined in very different proportions, is substituted into the place of pure atmospheric air, the diminution increases in a tenfold degree. Now, the repeated breathing of the same atmospheric air, has been shewn to bring on the most distressful symptoms, and at length an utter inability to continue respiration; and Mr. Davy tells us, that after a voluntary exhaustion of his lungs, he could respire the nitrous oxyd with accuracy, when stooping, for about half a minute, but, even then, strong sensations were produced, with fulness about the head rather alarming: that if the respiration extended to three-fourths of a minute, he could not rely on the accuracy of any experiment; and that the determination of blood to the head became, in less than a minute, so great as often to deprive him of voluntary power over the muscles of his mouth. (Researches, p. 392.) But respiration is a function carried on by the exertion of muscular powers, in a great degree obedient to the will; and the quantity of residual air in the lungs in preternatural respiration will at all times be much influenced by the manner in which the will exerts itself, and the degree in which the muscles are able to act. When, therefore, the power of the will over the muscles is in any degree diminished, or is wholly lost, or the muscles themselves are much weakened, a proportional derangement will take place in the respiratory function; and as, in the natural condition of the body, expiration is subsequent to inspiration, the ability to inspire will last longer than the ability to expire: consequently the cessation of the process is brought about by a failure in the expiratory powers. But if the expiratory powers

are unable to expel the air from the lungs, it must remain in those organs; and hence we see in all the foregoing examples, that the diminution in the volume of expired air was greater in proportion as the respiratory organs suffered distress or oppression, and amounted even to more than one-third of the air inspired, when all voluntary powers ceased. Inquiry, &c. § 86—92.

From the above data it may be estimated, that by each ordinary expiration one-seventh part of the whole contents of the lungs is discharged, and that by the most violent expiration somewhat more than four-sevenths of the air contained in them is evacuated. Supposing that each respiration occupies about three seconds, a bulk of air nearly equal to three times the whole contents of the lungs will be expelled in a minute, or about 4114 times their bulk in 24 hours. The quantity of air respired during the diurnal period will be 1,152,000 cubic inches, or 666 $\frac{1}{2}$ cubic feet.

II. *Changes produced in the Air.*—Although the ancients were not unacquainted with the general fact, that respiration produces a change in the air received into the lungs, the first accurate notions respecting this change, were furnished by the experiments of Boyle. He not only proved, by means of the air-pump, the absolute necessity of air to the support of animal life, but he farther discovered, that the action of the lungs is quickly suspended, unless they are furnished with a regular supply of fresh air. (Works, v. 1. p. 99, et seq.) “Animals, whose hearts have two ventricles, and no foramen ovale,” says Mr. Derham, “as birds, dogs, cats, and mice, die under the action of the air-pump in less than half a minute, counting from the very first exfunction, particularly in a small receiver.” (Physico-Theology, p. 8.) The same position is corroborated by an experiment, exhibited before the Royal Society by Dr. Hooke. He cut away the ribs, diaphragm, and pericardium of a dog, whereby the lungs and heart were brought into view; and then dividing the windpipe, he introduced into it the nozzle of a pair of double bellows, and made, at the same time, several small punctures through the outer coat of the lungs. By blowing in a stream of fresh air, which continued to escape through the small apertures made in the lungs, he was enabled to keep those organs fully distended. As long as he supplied the lungs with air, the actions of life continued, and the heart beat very regularly; but, on intermitting the supply, the dog would immediately fall into dying convulsive fits; and revive again as soon as the lungs were filled with a stream of fresh air. The circulation through the lungs continued both during their distended and collapsed state, and as well when they were kept at rest, as during their state of motion; whence he concluded, that neither the motion of the lungs, nor the cessation of their motion, nor the stopping of the circulation of the blood through them, was the immediate cause of death; but the want of a sufficient supply of fresh air. Lowthorp's Abridg. Phil. Trans. v. 3. p. 66.

From these facts it was naturally concluded, that the air had undergone some important change during its continuance in the pulmonary vesicles, and a variety of hypotheses and conjectures were formed to account for this alteration. The knowledge which was then obtained respecting the air was, however, almost entirely confined to its mechanical properties, so that the theories of respiration, formed during this period, were necessarily crude and imperfect. Boyle perceived that the air, in passing through the lungs, became loaded with a quantity of aqueous vapour, and he farther supposed, that it acquired, what he calls, recrementitious steams (Works, v. 3. p. 371, et seq.); but respecting

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specifying the nature of these steams he forms no conjecture. He observed also, that the air in which an animal had respired for some time, was considerably diminished in volume, an effect which he attributed to the loss of part of its elasticity or spring. The contemporaries of Boyle, for the most part, coincided with him in his ideas respecting respiration; there were, however, some philosophers, who supposed, that besides the addition of these vapours, the air, during its continuance in the lungs, imparted something to the blood. Among these, the first in point of genius and originality was Mayow of Oxford. He investigated the properties of the air, and the effects produced upon it by respiration, with great acuteness, and concluded, that a peculiar volatile spirit, which was one of the constituents of the atmosphere, was absorbed by the blood during its passage through the lungs. Borelli, Lower, Willis, and others, adopted opinions in many respects similar to that of Mayow; they imagined, that either a portion of the whole mass of air, or some particular constituent of it, was absorbed by the blood, and by this means converted this fluid from the venous to the arterial state. But so little real knowledge was at this time possessed respecting the composition of the atmosphere, that they entirely failed in their attempts to ascertain the nature of the matter absorbed, and their hypotheses appeared to extravagant; and so little founded upon truth, that their doctrines fell into discredit, became neglected, and at length were totally forgotten. *De Motu Anim.* p. 2a. prop. 113. *De Corde*, p. 159—165. Willis, *Pharm. Rat.* p. ii. p. 34.

Dr. Hales devoted much of his attention to this subject, and performed many experiments with a view to illustrate the manner in which the air is affected by the lungs; he concludes nearly as Boyle had done, that it acquires a noxious vapour, and that its elasticity is diminished. (*Statical Essays.*) The learned Boerhaave confesses his inability to explain the changes which the air experiences by respiration. (*Prælect.* t. 5. p. 169, et seq.) The opinion of Haller was not materially different from that of Boyle and Hales; he had collected all the different theories which have been advanced upon this subject, and after reviewing them with his accustomed candour and perspicuity, he concludes, that the air, when it is emitted from the pulmonary vesicles, is combined with a quantity of water, and a peculiar noxious vapour, and has its elasticity diminished. (*Notæ ad Boerhaav. Prælect.* t. 5. p. 170. *Element. Physiol.*) Such was the imperfect state of our knowledge, when Haller wrote his *Elements of Physiology*! This noble monument of industry and genius was scarcely published, when Dr. Black commenced his experiments upon fixed air, and among other interesting discoveries, satisfactorily proved, that this peculiar gaseous substance is generated in the lungs during respiration.

“So early as the year 1757,” says this distinguished philosopher, “I convinced myself, that the change produced in wholesome air by breathing it, consists chiefly, if not solely, in the conversion of part of it into fixed air; for I found, that by blowing through a pipe into lime-water, or a solution of caustic alkali, the lime was precipitated, and the alkali rendered mild.” (*Black’s Lectures*, by Robison, v. 2. p. 87.) At a later period, Mr. Bewley detected the formation of carbonic acid in respiration by a method somewhat similar: he found, that on breathing through an infusion of litmus, the same change to a red colour was produced in it, as when it was exposed to the action of fixed air; and when, by adding a few drops of the water of potassa, the blue colour was restored to the infusion, it could again be made to disappear by super-

fatrating it with the acid expired from the lungs. *Priestley on Air*, v. 5. p. 383.

The particular substance which constituted the wholesome part of atmospheric air, was not, however, known to Dr. Black at the time his experiments were made: and long before the compound nature of the atmosphere was ascertained, it had been supposed by many philosophers, that, to use the language of bishop Berkeley, “there was no such thing as a pure simple element of air. There is,” he adds, “some one quality or ingredient in the air on which life more immediately and principally depends. What that is, though men are not agreed, yet it is agreed it must be the same thing that supports the vital and the common flame; it being found that when air, by often breathing in it, is become unfit for the one, it will no longer serve for the other. This quality of the air is necessary both to vegetables and animals, whether terrestrial or aquatic; neither beasts, insects, birds, nor fishes, being able to subsist without air: and when air is deprived of this ingredient, it becometh unfit to maintain either life or flame, even though it should retain its elasticity.” (*Siris*, § 143, et seq. 2d edition.) Dr. Hooke asserted, that this ingredient or substance, inherent in, and mixed with the air, is like, if not the very same, with that which is fixed in saltpetre, by which, during combustion, inflammable bodies are dissolved. (*Micrographia*, p. 103.) The same opinion was afterwards held by Willis, Lower, and Mayow, all of whom likewise considered the nitrous quality of the air to act an important part in respiration. The last author, in particular, made experiments precisely similar to those which have lately been brought forward to prove, that both by the burning of a candle, and other combustible bodies, and by the respiration of animals, the nitro-aërial particles of the air were exhausted, whereby the volume of air was diminished, and the residual air was unable afterwards to support either life or flame. (*Tractat. Quinquè*, p. 98, et seq.) The exhibition, however, of this peculiar, or nitro-aërial, part of the air in a distinct and separate form, we owe to the genius of Scheele and Dr. Priestley, who discovered, independently of each other, in the year 1774, pure or dephlogisticated air or oxygen gas. The atmosphere, which, until this period, had been regarded as a homogeneous elementary body, was discovered by these celebrated experimenters, to be compounded of two aëriiform fluids, possessing distinct properties, and having totally different purposes in the economy of nature. These substances, which have since obtained the names of oxygenous and azotic gases, were found to exist in the atmosphere, in the constant proportion of about 22 to 78. This great discovery, and the use which he made of it, enabled Dr. Priestley to propose the first consistent explanation of the phenomena of respiration that had ever been offered to the public; and, although the theoretical opinions on which that explanation was partly founded, no longer exist, yet it should never be forgotten that his experiments and discoveries first pointed out the true path of investigation; and have contributed, in a pre-eminent degree, to advance our knowledge of this most important function. The cause of the unfitness of air, beyond a certain extent, to support life and flame, he proved to arise from the destruction of its pure part, or what has since been called its oxygen gas; and he concluded, that, in respiration, combustion, and calcination, which, in consequence of his peculiar theory, he styles phlogistic processes, it underwent precisely the same changes. *Philos. Transf.* 1776. *Obs. on Air*, v. 3. p. 9.

About a year after the publication of Dr. Priestley’s experiments, the celebrated and unfortunate Lavoisier pre-

sent a memoir on respiration to the French Academy of Sciences. (Mem. de l'Acad. des Sciences, 1777.) After paying a tribute of respect to the genius of Dr. Priestley, he proceeds to an accurate examination of his experiments, and the conclusions which were deduced from them. He agrees with the doctor in supposing, that the proportion of oxygen is diminished in air which has been respired, but upon a careful analysis of the residue, he finds it to differ from the air left after the calcination of metals, which is merely azotic gas, in containing a quantity of carbonic acid. He also observed, that the bulk of the air was somewhat diminished, and we learn in general from these experiments, that the changes produced in air by respiration, consist in the removal of part of the oxygen, in the addition of a quantity of carbonic acid gas, and in the diminution of its volume. He supposes that the azote is not affected by the process, and that it serves merely to dilute the oxygenous part of the atmosphere.

In this paper, M. Lavoisier does not mention the aqueous vapour which is so evidently discharged from the lungs by respiration; it is impossible that it could have been overlooked by so accurate an observer; we may therefore conjecture, that he omitted to mention it, because at this period he considered it as only diffused through the air expired from the lungs, by the process of evaporation, and not formed in consequence of the operation of any chemical affinities.

The conclusions of this philosopher respecting the changes produced by respiration upon the air taken into the lungs, are for the most part acquiesced in by modern physiologists, and the researches which have been since made upon this subject are principally directed, either to ascertain with more precision the proportion of the respective ingredients in the air of expiration, or to frame hypotheses to account for the operation of the lungs in effecting these changes.

Among the investigations, however, of a date subsequent to this memoir of Lavoisier, those of Messrs. Allen and Pepys, published in the Philosophical Transactions, 1808 and 1809, deserve peculiar mention, on account of their great accuracy, and the satisfactory manner in which they have consequently enabled us to determine some doubtful points.

Quantity of Oxygen consumed.—"A difficult and interesting question," says Dr. Boileau, "respecting the consumption of oxygen, is the absolute quantity of this gas consumed by respiration in a given time. The first calculations which were made upon this subject, in consequence of the imperfect nature of the apparatus employed, and of the want of a sufficient dexterity in the management of pneumatic experiments, were unavoidably vague and inaccurate. The difficulty was much increased by a circumstance first noticed by Dr. Crawford, and afterwards more fully investigated by M. Jurine of Geneva, and M. Lavoisier, that the respiration of the same animal in different states of the system, and under the operation of different external circumstances, affects the air in very different degrees. This curious fact, which affords an insight into some of the most important operations of the animal economy, must unavoidably produce great differences in the results of the best conducted experiments, and will render it impossible for us to arrive at more than an approximation to the truth. The circumstances which have been discovered to influence the chemical effects of the respiration are, the temperature of the air respired, the degree of muscular exertion, the state of the digestive organs, and the condition of the system as affected by fever; it is highly probable that other circum-

stances will be discovered, by multiplying and varying our experiments upon the living body."

An experiment performed by Lavoisier, upon a guinea pig, seems to have been the first in which a perfect apparatus, and the necessary degree of accuracy, were employed. (Mem. de l'Acad. des Sciences, 1780, p. 401—8.) The animal was confined over mercury, in a jar containing 248 cubic inches of gas, consisting principally of oxygen. In an hour and a quarter, the animal breathed with much difficulty, and being removed from the apparatus, the state of the air was examined. Its bulk was found to be diminished by eight cubic inches, and of the remaining 240 inches, 40 were absorbed by caustic potash, and consequently consisted of carbonic acid gas. Taking 100 parts of this air, these numbers will be as follows; the air was diminished to 96.5, or by 3.5 cubic inches, and of the remainder, 16.5 were converted into carbonic acid gas, and absorbed by potash, which reduces the quantity of air to 80 cubic inches. Towards the conclusion of the experiment, the air would be necessarily much less fit for performing the functions of the lungs than the air of the atmosphere, in consequence of the carbonic acid gas which it contained; but as the air employed was originally much purer than the atmosphere, the author supposes; that the quantity of oxygen destroyed, was probably about the same which would have been consumed under the ordinary circumstances of respiration.

The same philosopher performed a second experiment upon the same species of animal, with still more accuracy, in which pure oxygen was employed. (Ann. de Chimie, t. 5. p. 261, et seq.) This experiment continued during an hour and a half, and the animal being then removed from the jar, the air was analysed as in the former case: 1728 cubic inches of air were found to be reduced to 1673, *i. e.* had suffered a diminution of 55 inches, caustic potash absorbed about 229.5 inches, leaving a residue of pure oxygen. These numbers, estimated as in the former case, will be nearly as follows; 100 inches were reduced to 96.82, or by 3.18 inches, the potash absorbed about 19 inches, reducing the whole quantity of air to 77.82 parts. The quantity of carbonic acid was here somewhat greater than in the former experiment, which may be attributed to the air employed being pure oxygen, and to the process having been continued for a somewhat longer space of time than in the former instance. Upon the whole, the results correspond as nearly as can be expected, from the very delicate nature of the experiments.

Dr. Menzies first attempted to ascertain the quantity of oxygen consumed by a man, in the course of a day. He found by experiment, that one-twentieth part of air, which had been once respired, is converted into carbonic acid gas: this he concludes must have been oxygen, as that part of the air alone is affected by respiration. He conceives that 720 cubic inches of air are respired in a minute, of which consequently 36 will be consumed. From these data, he estimates, that in the space of 24 hours, 51,840 cubic inches, or 17625.6 grains of oxygen, are consumed and converted into carbonic acid gas. In this calculation several important particulars appear to have been overlooked, and accordingly it will be found to differ from the results of the more accurate experiments, which have been since performed by M. Lavoisier, and Mr. Davy.

The experiments which were made by M. Lavoisier, in conjunction with his friend M. Seguin, were conducted with every possible attention to accuracy, and with an apparatus more complete than any which has ever been employed in physiological researches. An account of them is detailed in two papers in the memoirs of the Academy of Sciences

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Sciences for the years 1789 and 1790; but notwithstanding the peculiar advantages under which they were performed, their results will not be found in all instances to coincide. M. Seguin was himself the subject of the experiments. The authors begin by pointing out the different effects which are produced by respiration, under the different circumstances in which the body is placed; and they farther remark, that individuals may probably differ in the absolute quantity of oxygen which they consume in the same circumstances. Making a due allowance for these variations, they conclude, that the mean consumption of oxygen by a man, during 24 hours, is somewhat more than 22 French cubic feet, or 46037.38 English cubic inches; a quantity of gas which will weigh 15661.66 grains troy.

Lavoisier was still continuing to pursue his experiments on this subject, and had constructed a very expensive apparatus, for ascertaining with still more precision the amount of the several changes produced by respiration, when he fell a sacrifice to the fury of Robespierre, and received sentence of death. He had already performed a number of experiments with his new apparatus, and earnestly requested a respite of a few days, in order to prepare them for publication; but his request was not granted. M. de la Place, who pronounced his eulogy, has fortunately given us the most important results: they will be found to differ in some particulars from the former experiments, though, with respect to the quantity of oxygen consumed, they nearly coincide. It is stated that a man in 24 hours consumes 15592.5 grains.

There are some experiments on this subject by Mr. Davy, which appear to have been executed with great accuracy. From a number of trials made upon his own respiration, he found, that 100 cubic inches of atmospheric air, after having once passed through the lungs, had lost between four and five parts of oxygen: hence he calculates, that 31.6 cubic inches of oxygen are consumed in a minute; this will give 45,504 inches in 24 hours, a quantity which will weigh 15471.36 grains. This estimate coincides nearly with that of M. Lavoisier, though it was obtained by a different process, and by the use of a different apparatus. We may, therefore, conclude, that between 45 and 46,000 cubic inches, or about 15,500 grains = 2 lbs. 8 oz. troy, is the average quantity of oxygen consumed by a man in 24 hours. Davy's Researches, p. 431—434. Essay on Respiration, p. 78—84.

In the series of experiments lately performed by Messrs. Allen and Pepys, an apparatus was employed, in which the volume of the air respired could be measured with great accuracy, and in which a large quantity (3 or 4000 cubic inches) could be respired; so that the source of error, to which experiments on a smaller scale are liable, from the influence of the residual air in the lungs, is much diminished. They caused a person to inspire, from a gasometer, 3460 cubic inches of atmospheric air, which were afterwards expired into another gasometer; and to both gasometers graduated scales were affixed, by which the quantities of air received and expelled could be accurately measured. The time occupied in the experiment was 11 minutes: about 58 respirations were made; and the deficiency in the whole volume of air, at the close of the experiment, amounted only to 23 cubic inches. One hundred parts of the expired air afforded, on analysis, 8.5 carbonic acid, 12.5 oxygen, and 79 nitrogen gas. (Phil. Transf. 1808, p. 254.) In an experiment on the respiration of another subject, the changes produced in the air were the same, but the quantity consumed was very different. The thermometer (Fabr.) being at 56°, and the barometer at 30°.3, 3300 cubic

inches of atmospheric air were inspired, and 3311 expired in 5½ minutes. One hundred parts of the expired air consisted of 8.5 carbonic acid, 12.5 oxygen, and 79 azote. When, therefore, twice the quantity of air was passed through the lungs in a given time, as great a proportion of its oxygen was consumed, and as much carbonic acid formed, as in a subject in whom only half the quantity was breathed. The experiment was repeated several times; and in one instance, 9890 cubic inches of air were breathed for 24½ minutes, with the loss of only 18 cubic inches, and 100 parts of the expired air then afforded, on analysis, 8 carbonic acid, 13 oxygen, and 79 nitrogen. (Ibid. 257.) Now the air employed in these experiments contained, in 100 parts, 21 oxygen and 79 nitrogen; and in the numerous analyses, which were made of this air after its respiration, the portion of oxygen that disappeared was exactly replaced by that of carbonic acid produced; so that, in every instance, these two gases formed together 70ths of the respired air, the remaining 79 parts being pure nitrogen gas. It is, therefore, concluded, that the quantity of carbonic acid gas emitted is exactly equal, bulk for bulk, to the oxygen consumed. Ibid. p. 279.

In subsequent experiments on the respiration of a guinea pig, these chemists found, that when 310 cubic inches of atmospheric air were breathed for 25 minutes by this animal, its volume experienced no variation whatever; and the portion of its oxygen, which disappeared, was replaced by an equal bulk of carbonic acid. (Phil. Transf. 1809, p. 414.) Three experiments were made on the respiration of the guinea pig, in two of which the time occupied was 25 minutes, and in the third one hour. The animal was confined in a certain volume of air, which was changed successively, so that the same air may have been breathed more than once; while in the experiments of these gentlemen on human respiration, just detailed, the air was only once breathed. In all the three experiments with the guinea pig, 100 parts of the air breathed contained the same constituent elements, viz. 5 carbonic acid, 16 oxygen, 79 azote. (Phil. Transf. 1809, p. 413, et seq.) Wherefore, they justly conclude, that when atmospheric air alone is respired, even by an animal subsisting wholly on vegetables, no other change takes place in it than the substitution of a certain portion of carbonic acid gas for an equal volume of oxygen. Ibid. p. 427.

In respiration as nearly natural as possible, these gentlemen estimate the quantity of oxygen consumed on an average at 26.6 cubic inches, at the temperature of 50°, and barometrical pressure of 30°.4.

The changes occurring in respiration are influenced by various causes, which modify the actions of the capillary vessels. Crawford established by experiment, that less oxygen is consumed at a high than at a low temperature (Experiments on Animal Heat, p. 307.); and this was confirmed in the experiments of Lavoisier and Seguin (Mem. de l'Acad. des Sciences, 1789, p. 575.); a man consuming, at the temperature of 54°, 1344 cubic inches of oxygen in an hour, while, in an atmosphere at the temperature of 79°, he consumed only 1210 cubic inches. Crawford observed also, that in an animal placed in a warm medium, the venous blood approached to the arterial in colour. Hence it appears, that the high temperature counteracts those chemical changes which the blood undergoes in the extreme vessels; and that the diminution in the consumption of oxygen by respiration is owing to this cause, and not, as has been supposed, to the rarity of the air at the high temperature. If the consumption of oxygen were diminished from the latter cause, the blood ought to be even more completely venous than

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than usual. The fact formerly known, that the consumption of oxygen is influenced by the food and the state of digestion, was confirmed and more accurately demonstrated by Lavoisier and Seguin. They found, that during digestion the consumption of oxygen was increased to 1800 or 1900 cubic inches in an hour. Exercise, too, increased the proportion consumed. It is stated that Seguin, in continuing the exercise of raising a weight of 15 pounds to a height of 613 feet during a quarter of an hour, consumed 800 cubic inches, which is at the rate of 3200 in an hour; and the same exercise, made during digestion, occasioned a consumption equal to 4600.

Notwithstanding, however, says Mr. Ellis, the necessity of oxygen gas to the continuance of respiration, and the great quantity of it that is thus daily consumed, many facts tend to prove, that, by the very constitution of that function, a necessary limit is placed to its consumption: and that this limit is determined, not by the purity of the air employed, but by some circumstances inherent in the animal system. It has been found, that the growth of vegetables is retarded by a great superabundance of oxygen (Ellis's Inquiry, § 14. 40.); and that, although insects will live a considerable time in this gas, yet their breathing becomes oppressive, and they die (*ibid.* § 53.) long before the whole of it is consumed. There can be little doubt but that the other classes of inferior animals would, under the same circumstances, suffer in the same manner. In the experiment also made by Lavoisier on the guinea pig, already described, the animal is said to have breathed with much difficulty, although not more than one-fifth of the oxygen gas was consumed: but some experiments of the same author, at a later period, seem in opposition to this fact. In comparing together the phenomena of combustion and respiration, he observes, that much more combustible matter is consumed in a given time in vital air, than in that of the atmosphere, but that the same circumstance does not hold in respiration: for whether animals respire oxygen gas in its pure state, or mixed with a proportion, more or less considerable, of nitrogen gas, the quantity of oxygen which they consume is always the same. If a guinea pig, he adds, be kept for several days in oxygen gas, or in a mixture composed of fifteen parts nitrogen and one of oxygen, preserving constantly these proportions, the animal in both cases continues in his natural state: his respiration and circulation do not sensibly appear to be either accelerated or retarded: his temperature remains the same, and he has only, when the proportion of nitrogen gas is too great, a slight disposition to drowsiness. *Mem. de l'Acad. 1789.*

The results of Mr. Davy's experience, however, do not correspond with these conclusions of Lavoisier. He introduced a mouse into a jar containing an atmosphere composed of 10.5 cubic inches of oxygen, and three inches of nitrogen gas. In half an hour the animal appeared to suffer much, and, in about an hour, lay down on his side, as if dying: in an hour and a quarter he was withdrawn from the jar alive, but motionless. The residual air, on being analysed, was found to have lost only 2.1 cubic inches of its oxygen gas, and consequently 8.4 inches of that gas still remained. Another mouse, which was put at the same time into a jar containing 15.5 cubic inches of atmospheric air, was taken out through the mercury alive, but unable to stand, in 50 minutes: and on analysing the residual air, 2.7 cubic inches of its oxygen were consumed. Hence it appears, that the mouse in atmospheric air consumed nearly one-third more of oxygen in 50 minutes, than the other mouse did in an hour and a quarter, when placed in a jar containing so large a portion of oxygen. (*Researches, p. 443.*)

The results of these experiments on mice are corroborated by those made by Mr. Davy on his own respiration; for he found, that he consumed much less oxygen gas when he respired it pure, than when, for the same length of time, he breathed atmospheric air; and the quantity of carbonic acid formed in the first case, was but little more than half that obtained by the respiration, for the same time, of atmospheric air. (*Ibid.* 442.) Messrs. Allen and Pepys state, on the contrary, that when pure oxygen gas is breathed, more of it is consumed in a given time, and more carbonic acid formed, than in breathing atmospheric air. The experiments of Davy differ greatly therefore from those of Lavoisier as to the effects produced by the respiration of oxygen on the animal system; for, while the latter philosopher informs us, that this gas may be respired for many days without inconvenience, Mr. Davy has shewn that the animal dies long before the whole of it is consumed. Trusting, therefore, to the accuracy of Mr. Davy's experiments, as in all respects supported by analogy, we infer, that an excess of oxygen gas in the air that is breathed, is not suited to the due maintenance of the respiratory function: and, on the other hand, the oppressive symptoms which the respiration of impure air occasions, as well as the results of Lavoisier's experiments, in which nitrogen superabounded, equally instruct us, that a deficiency of this gas is alike unsuited to it. Consequently, we may conclude, that the atmosphere, as it is naturally composed, is best adapted to the economy of the animal system; but that this system is, at the same time, so constituted, as to be able to bear great variations in the composition of the air without immediate injury to the powers of animal life.

When, however, this variation proceeds to a certain extent, the air is no longer capable of supporting vital action; but different animals, when confined in given volumes of air, possess the power of prolonging this action in very different degrees. Thus insects, worms, fishes, and the amphibia, live until all the oxygen gas of the air is nearly or entirely consumed (Ellis's Inquiry, § 53, et seq.); while birds die in a given quantity of air before they have consumed two-thirds of its oxygen (*ibid.* § 84.), and a mouse and guinea pig expire when about three-fourths of this gas have disappeared. Dr. Priestley observed, that if a mouse can stand the first shock of being put into impure air, or has been habituated to it by degrees, he will live a considerable time in air in which other mice will instantaneously die. (*Experiments on Air, p. 257.*) When, however, death does happen to animals in a given volume of air, it must arise either from the noxious operation of the nitrogen gas that is always present, or from that of the carbonic acid, which is formed; or it must proceed from the deficiency, or total absence, of oxygen gas. Now, although nitrogen gas do not of itself support life, yet we have no evidence that it exerts any injurious effects on the animal system. In vegetation, and in the respiration of the inferior animals, it has been shewn to be wholly inactive; and when, in the experiment of Lavoisier, it constituted $\frac{1}{5}$ ths of the air employed, a degree of drowsiness only seems to have been induced by it. That it is entirely passive, is still farther confirmed by an experiment of Lavoisier, who found that hydrogen gas, mixed in due proportion with oxygen, would serve the purposes of respiration as well as the air of the atmosphere. We have no proof that nitrogen is able to enter the vessels so as to produce any direct operation on the blood,—an effect which is still farther forbidden by its incapacity of uniting with that fluid. We may therefore conclude, that nitrogen gas, when respired, neither suffers any change itself, nor produces any direct operation on the animal system.

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The only other gas to which the death of animals, in these circumstances, can be ascribed, is carbonic acid, which, however, when formed by respiration, does not seem destructive to animal life. Dr. Goodwyn observes, that when the same air is breathed several times, so as to increase the quantity of carbonic acid, its noxious operation is to be attributed not to the presence of this acid, but to the deficiency or absence of oxygen gas (Connection of Life, &c. p. 66.); and when Spallanzani, by means of an alkaline substance, abstracted this acid as soon as formed by the respiration of birds and quadrupeds, he did not find that they lived longer in a given bulk of air than when it was suffered to remain. (Memoirs on Respiration, p. 318.) Dr. Higgins observes, that debility, convulsions, and death, follow the successive diminution of the oxygen gas of the air in respiration, long before the whole of that gas is consumed, although the carbonic acid that is generated be, in the mean time, carefully withdrawn. (Minutes of a Society, p. 160.) Indeed, we might in this, as in former examples, be led to suppose, that neither the carbonic acid formed in respiration, nor the nitrogen gas employed in that process, would exert any positively destructive operation on the animal powers, since both of them must, at all times, necessarily be present in the system; and seeing, moreover, that the abstraction of oxygen gas alone is sufficient to account for the fatal effects which ensue, it must be deemed unnecessary to resort to the supposed agency of any subordinate cause. Inquiry, &c. § 127—130.

Quantity of Carbonic Acid produced.—Having ascertained the proportion of oxygen which is consumed in respiration, it next remains for us to determine the quantity of carbonic acid gas which is produced. It appears that Dr. Black first demonstrated its existence in air emitted from the lungs, and that Lavoisier afterwards examined it with more accuracy, and found that the air, in which an animal had expired, contained about one-sixth of its bulk of carbonic acid gas. (Acad. des Sciences, 1777.) In the experiment which this philosopher performed with a more perfect apparatus, upon a guinea pig confined in oxygen, the carbonic acid amounted to nearly one-fifth of the bulk of the whole air employed, when the animal had been detained in the apparatus until the air was reduced into a state no longer fit for respiration. (Annales de Chimie, t. 5. p. 261, et seq.) These experiments, however, only prove what proportion of carbonic acid gas will render air incapable of supporting life, without acquainting us with the quantity of this gas produced under the ordinary circumstances of respiration.

M. Jurine of Geneva, appears to have been the first who attempted to calculate the absolute quantity of carbonic acid formed by the respiration of man; he imagined that it constituted about one-tenth part of the air emitted from the lungs. (Encycl. Method. Médecine, v. 1. p. 494.) Dr. Menzies instituted a set of experiments to discover the absolute quantity generated in a given time; he infers from them, that $\frac{1}{5}$ th part of air which has been once respired, is carbonic acid, and estimates, that a man, in 24 hours, sends out from the lungs 51,840 cubic inches, or nearly 4lbs. troy; but this estimate is probably over-rated. Essay, p. 50.

The circumstances which have been already pointed out, as influencing the consumption of oxygen, have at least as powerful an effect upon the production of carbonic acid gas. Accordingly we shall find the calculations of the most accurate experimenters upon this subject so widely different from each other, that it seems scarcely possible to arrive at any tolerable degree of certainty.

M. M. Lavoisier and Seguin, in their first memoir of

1789, estimate the average quantity of carbonic acid gas, formed by a man in 24 hours, at 17720.89 grains troy; in their subsequent memoir, published in the following year, this quantity is diminished to 8450.24 grains; and in the eulogy of Lavoisier by La Place, it is stated, that Lavoisier, in his last experiments, reduced it still lower, to 7550.40 grains. Mr. Davy, on the contrary, whose experiments seem to have been performed with great exactness, though with a less complicated apparatus than that employed by the French chemists, supposes the carbonic acid formed in 24 hours to amount to 17811.38 grains (Researches, p. 434.), a quantity which is not very different from that first announced by Lavoisier.

Mr. Murray found that he expired 265 cubic inches of air in 30 seconds, and he discovered in this 16.57 cubic inches of carbonic acid. Making a deduction for the small quantity of this acid contained in the inspired air, he assumes 16 cubic inches as the quantity formed by respiration in 30 seconds. He calculated the quantity of oxygen consumed at 19 cubic inches: the ratio, therefore, between the calculated quantity of oxygen consumed, and the actual quantity of carbonic acid formed, was as 100 to 84.5. Syll. of Chemistry, v. 4. p. 494.

Messrs. Allen and Pepys conclude from their experiments, that the atmospheric air expelled from the lungs usually contains from 8 to 8.5 per cent. of carbonic acid, and that the proportion of acid in no case exceeds 10 per cent. They estimate the quantity of acid thrown off in 11 minutes at 302 cubic inches, which is about 27.45 per minute; and supposing the production uniform for 24 hours, the total quantity in that period would be 39,534 cubic inches, weighing 18,683 grains, or rather more than 11 oz. troy. Phil. Transf. 1808.

If a larger quantity of air be passed through the lungs in a given time, more carbonic acid is formed, but it still preserves the same ratio to the other component parts of the expired mass. Thus, 3300 cubic inches of air were inspired by one person in 5½ minutes, and as each 100 parts contained 8.5 of carbonic acid, the whole acid formed in this time was 281.42 cubic inches. The first and last portions of a single expiration differ considerably in their proportions of carbonic acid, because the former consists principally of air contained in the fauces, trachea, and its larger branches, while the latter comes from the air-cells themselves. In small quantities of the first portions, given off by natural and easy expirations, the carbonic acid formed from three to five per cent. When an expiration was made as complete as possible, the utmost efforts being employed to press the air out of the lungs, 20.4 cubic inches were expelled, and the proportion of carbonic acid was 9.5. Now as the first portions contain only from three to five per cent., the last must have contained more than the average, or 9.5. When 300 inches of atmospheric air were repeatedly breathed, until the laborious state of respiration compelled the operator to desist, 100 parts of the expired air contained 9.5 carbonic acid, 5.5 oxygen, and 85 azote. When a similar trial was repeated until the operator became insensible, 100 parts of the air contained 10 carbonic acid, 4 oxygen, and 86 azote. (Phil. Transf. 1808.) When 3260 cubic inches of gas, consisting of 97.5 oxygen, and 2.5 azote in 100 parts, were respired for 9 minutes and 20 seconds, the expired air measured 3193 inches, and contained, in 100 parts, 11 carbonic acid, 83 oxygen, 6 azote. Here, therefore, 37.64 cubic inches of carbonic acid were emitted from the lungs in one minute by the same individual, who produced 27.45 per minute, when he breathed common air. In another instance, 3420 cubic inches of similar air were breathed for 7' 25":

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the expired air measured 3362. The first 250 cubic inches consisted, in 100 parts, of 9 carbonic acid, 25 azote, 66 oxygen; the last, of 12.5 carbonic acid, 5.5 azote, 82 oxygen: 100 parts of the whole expired air consisted of 12 carbonic acid, 6.5 azote, 81.5 oxygen. The whole quantity of carbonic acid gas emitted in this experiment was 396.78 cubic inches. *Ibid.*

The result, which shews a greater evolution of carbonic acid when oxygen is respired, is totally adverse to those obtained by Mr. Davy, and already mentioned. We do not therefore feel authorised in determining whether, in general, an increase in the quantity of oxygen employed augments the carbonic acid evolved, or whether the proportion of the latter depends on the condition of the respiratory organs, or variations in the exercise of their functions.

If it should be allowed, as the greatest number of investigations on the subject tends to prove, that the carbonic acid formed in respiration be less in bulk than the oxygen gas, which disappears, yet the weight of the compound is increased by the addition of carbon, derived from the animal system. Lavoisier and Seguin estimated the weight of oxygen gas consumed by a man in 24 hours, at 15661.66 grains; and that of carbonic acid produced in the same space of time, at 17720.89 grains; the carbon constituting $\frac{1}{10}$ th of the weight of the acid formed. In the experiments of Mr. Davy, the volume of oxygen gas that disappeared every minute was 31.6 cubic inches, and that of carbonic acid produced 26.6 inches. But one cubic inch of oxygen gas weighs 0.3474 of a grain, and therefore 31.6 cubic inches will weigh 10.97784 grains: again, one cubic inch of carbonic acid weighs 0.476 of a grain, and therefore 26.6 cubic inches will weigh 12.4222 grains. From these facts it would seem, that the proportion of carbon in the carbonic acid of respiration is much less than that which forms the same acid in combustion. For 100 parts of carbonic acid, formed by burning the diamond, contain, according to the very accurate researches of Allen and Pepys (*Phil. Transf.* 1807) 20.72 or 28.81 of carbon: and the proportion of carbon in 100 parts of acid is 28.77, when it is formed from charcoal and oxygen. (*Murray's Chemistry*, ed. 3. v. 2. p. 487.) But there are some points of the subject requiring the elucidation of further researches.

Alteration in the Bulk of the respired Air.—On no point of the respiratory process are the recorded results of different inquiries more at variance with each other, than about the question of the change in volume of the air, and the amount of that change. At first, it was generally believed, that the respired air undergoes some loss; and this opinion maintained its ground until very lately, although experiments were published, in which no such loss was observed. The most accurate modern researches are much in favour of the opinion, that the bulk of the atmosphere is not affected by breathing; and this view of the subject is the most generally entertained in the present day. Some think, that, although the volume of the respired air is not affected in ordinary natural breathing, it may be altered under particular circumstances. The determination of the question concerning the volume of the air, is closely connected with another respecting its absorption by the blood. We shall detail the facts and arguments on both sides, and point out that which has the most numerous and strong proofs in its favour.

The diminution of bulk was early noticed by Boyle, who estimated it at about $\frac{1}{3}$ th of the air employed. Mayow, whose genius enabled him to anticipate so many important discoveries of modern chemistry, confined an animal in a glass vessel inverted over water, and, by the aid of a siphon, brought the water on the inside of the vessel to a level

with that on the outside. Having then marked the height of the water by pieces of paper affixed to the side of the vessel, he observed its gradual rise as the animal continued to breathe; and then, comparing the space occupied by the air at the commencement of the experiment, with that which it possessed when the animal ceased to breathe, he found that it was reduced about $\frac{1}{4}$ th part of its bulk. (*Traçtat. Quinque*, p. 104.) In the experiments of Dr. Hales, the degree of diminution varied from $\frac{1}{5}$ th to $\frac{1}{6}$ th of the air employed. *Statistical Essays*, v. 1. p. 230. v. 2. p. 320.

Lavoisier, in the first memoir which he published upon respiration, ascertained the degree of diminution with more accuracy, and stated, that air, when rendered unfit to support life, was reduced $\frac{1}{5}$ th in bulk. (*Mem. de l'Acad. 1777.*) The experiments of Dr. Goodwyn afforded the same result.

The volume of air, taken into the lungs at a single inspiration, contained,

Phlogificated air	-	-	-	-	80
Dephlogificated air	-	-	-	-	18
Fixed air	-	-	-	-	2
				—	100

The volume of air, expelled from the lungs at the next succeeding expiration, contained,

Phlogificated air	-	-	-	-	80
Dephlogificated air	-	-	-	-	5
Fixed air	-	-	-	-	13
				—	98

Connection of Life, &c. p. 51.

In the account which Lavoisier gives of the first experiment upon the guinea pig, he found the diminution to amount to $\frac{1}{3}$ th of the bulk of the air employed (*Mem. de l'Acad.* 1780, p. 401.); and in the second set of experiments, the diminution was found to be $\frac{1}{4}$ th part (*Annales de Chimie*, tom. v. p. 261.); the greater absorption, in these cases, probably depending upon the greater purity of the air employed. In the experiments performed by Lavoisier, in conjunction with Seguin, upon the respiration of man, though in other respects so remarkable for their accuracy, there is no mention made of this circumstance, nor is it noticed by La Place, in his account of the experiments in which Lavoisier was engaged, immediately previous to his execution. In these instances we cannot determine whether Lavoisier conceived that no diminution actually took place, or whether he only neglected to notice it.

The general fact of the diminution of bulk in respired air, has been since confirmed by Mr. Davy, though the exact degree of absorption varied so much in his different experiments, that it is difficult from them to fix upon a quantity which may indicate the ordinary amount of this diminution. In the consideration of this question, as in the preceding one respecting the consumption of oxygen, and the production of carbonic acid, there are two distinct objects of inquiry. We may examine the degree of diminution produced in a given quantity of air, in which an animal has been confined, until it is no longer fit for supporting respiration; and in the second place, we have to ascertain the amount of the diminution which takes place in air, that has only once passed through the lungs, as is the case in the process of ordinary respiration. The first of these points only was examined by Lavoisier. Mr. Davy has made experiments upon both. In air which had only once passed through the lungs, he found the diminution in different trials

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trials to vary from $\frac{1}{70}$ th to $\frac{1}{100}$ th: when he received the same air repeatedly into the lungs, it was found to be diminished as much as $\frac{1}{16}$ th of its original bulk. (Researches, p. 431—435.) The former experiments, however, alone indicate the effects of natural respiration, and taking an average of their results, the amount of the diminution will be about $\frac{1}{20}$ th part of the whole air received into the lungs.

Mr. Murray of Edinburgh made some experiments on the alterations produced in the air by natural respiration, from which he calculates (for the quantity of air inspired was not measured) that there is a loss of 6 cubic inches in 265. System of Chemistry, vol. iv. p. 493, 494.

Messrs. Allen and Pepys, whose experiments we shall presently allude to, as affording the strongest arguments against a change of volume in the respired air, in natural breathing, met with a different result, when the circumstances of the experiment were changed. In their fourteenth experiment, 300 cubic inches of atmospheric air were, in the space of three minutes, passed eight or ten times through the lungs, until respiration became extremely laborious, and the operator was compelled to desist. On analysing the respired air, it was found to contain, in 100 parts, only 5.5 oxygen, 9.5 carbonic acid, and 85 parts of nitrogen gas. In the fifteenth experiment, which occupied also about three minutes, until the operator became quite insensible, the same quantity of air was employed, and afforded, by analysis, nearly the same results; for it contained, in 100 parts, 4 of oxygen, 10 of carbonic acid, and 86 of nitrogen. In the former experiment we observe, therefore, an increase of 6 parts of nitrogen, and a loss of 6 parts of oxygen; and in the latter, the oxygen had lost 7 from 21, and the nitrogen had gained 7 upon 29. (Phil. Transf. 1808, p. 260.) Hence it is inferred, that when, as in these experiments, respiration is attended with distressing circumstances, there is reason to conclude that a portion of oxygen is absorbed. Ibid. p. 280.

In some experiments on the respiration of rabbits and of guinea pigs, Mr. Berthollet found that the bulk of acid gas produced did not quite equal that of the oxygen which disappeared; so that the loss of oxygen appeared to vary from 1.07 to 4.09 per cent.

We proceed to state the result of those inquiries, in which the volume of the air has been found not to undergo diminution in the act of breathing. Among the earliest experiments of Dr. Priestley on respiration is one, in which he confined a mouse in a jar containing a given quantity of air, which was inverted over mercury. The animal was suffered to remain two or three days after he had died, in which time there was no sensible diminution of the air; but on passing lime-water into the jar, the air was diminished $\frac{1}{7}$ th part of its bulk; and when, in a subsequent experiment, the residual air was agitated in water, it was reduced between one-fifth and one-sixth of the whole. Obs. on Air, vol. v. p. 112, et seq.

Dr. Crawford found, also, that when the experiment was made over mercury, the diminution was not sensible; but that, if water of potassa was added to the residual air, it became mild, and the air was diminished in the same degree as if the experiment had been made over water, or nearly one-fifth of its bulk. (On Animal Heat, p. 146.) The variations in these results, compared with those before enumerated, arise, no doubt, from the more or less complete attraction of the carbonic acid by the fluids, over which the experiments were made; and, from the whole of them, we may collect, that when mercury is employed, which has no attraction for carbonic acid, the diminution is

hardly sensible; but that, when this acid is completely abstracted by an alkaline fluid, the loss of bulk amounts nearly to one-fifth of the whole air employed. This inference corresponds very exactly with what occurs in vegetation, and in the respiration of the inferior animals.

In the year 1806, Mr. Dalton's attention was directed to this subject, and he satisfied himself, by numerous experiments, that the bulk of carbonic acid, formed in respiration, was exactly equal to that of the oxygen gas consumed. On repeating these experiments, Dr. Thomson obtained, in some cases, nearly the same results; but, upon the whole, the bulk of oxygen that disappeared was somewhat greater than that of the carbonic acid formed. The difference, however, varied considerably, and kept pace with the diminution in the whole bulk of air; whence he considers it to arise from the abstraction of a part of the air by some other way than by respiration: and if this be allowed for, he believes the bulk of acid produced to be precisely equal to that of oxygen gas lost. Hence, says he, this oxygen must be changed into carbonic acid in the lungs; for oxygen gas, when changed into carbonic acid, does not sensibly alter its bulk. System of Chemistry, 3d edition. vol. v. p. 736, and 774.

These conclusions have been completely confirmed by the very accurate experiments, already noticed, of Allen and Pepys. There was a loss of 23 cubic inches only in 3460 breathed once, at 58 respirations, which occupied 11 minutes. In another experiment, 9890 cubic inches, of which the breathing occupied $24\frac{1}{2}$ minutes, lost only 18. In subsequent experiments on the respiration of a guinea pig, these chemists found, that when 310 cubic inches of atmospheric air were breathed for 25 minutes by this animal, its volume experienced no variation whatever; and the portion of its oxygen, which disappeared, was replaced by an equal bulk of carbonic acid. These results were particularly satisfactory in their tendency to establish the point, that the air undergoes no diminution; because the time which they occupied was more considerable, and the chance of error, therefore, diminished. The third trial with the guinea pig occupied one hour: the bulk of the atmospheric air, before the experiment, was 1060 cubic inches; after the experiment, 1061; the carbonic acid formed 53 cubic inches; the carbonic acid per minute, .88 of a cubic inch. (Phil. Transf. 1809, p. 414.) Wherefore they justly conclude, that when atmospheric air alone is respired, no other change is produced in it than the substitution of a certain portion of carbonic acid gas for an equal volume of oxygen.

The results of all the trials made by these gentlemen were not uniform, and the deficiency was sometimes greater than what has been stated. The deficiency varied from 4 to 62 cubic inches in ten experiments; in each of which, between 3 and 4000 cubic inches of air were breathed once, the time employed being 10 or 11 minutes in each experiment. They consider that the deficiency principally arises from the last expiration being made into a gasometer, and consequently meeting with more resistance; so that the lungs are less completely evacuated than in the expiration into the open air, with which the experiment commenced.

The difficulty, which these gentlemen allude to, of bringing the lungs to the same state exactly at the end as they were in at the beginning of the experiment, is evinced by the result of their thirteenth trial, which also affords a strong argument against the diminution of bulk, which has hitherto been almost generally assumed as a result of the respiratory process. In $5\frac{1}{2}$ minutes, 3300 cubic inches were inspired, and 3311 expired; thus exhibiting an increase of 11.

Amid this conflict of authorities, we have no difficulty

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in declaring it, as our decided opinion, that the experiments least liable to error, most carefully performed, and therefore deserving our greatest confidence, are those which contradict the notion of an absorption of oxygen.

“In cases,” says Mr. Ellis, “where so many causes concur to render the apparent bulk of acid less than it ought to be, and less than that of the oxygen lost, it is surely more reasonable to give greater credit to those results, which indicate an equality of volume between these gases, than to those which declare a difference; since the former not only go with the latter to the fullest extent; but, pursuing the same track, have actually gone beyond them, and thereby reached a point, which the others have been unable to gain. In fact, to prefer those experiments, which indicate a difference, to those which prove an equality of volume, would be not only to halt in our progress, but to make a retrograde movement, and thus to infer a negative inference to outweigh a positive proof.” Further Inquiry, p. 279.

By the experiments of Messrs. Allen and Pepys, we have seen it proved, that when a guinea pig breathes a given quantity of air in a natural manner, no variation whatever was observed in the bulk of that air; and that in man, in whom many causes, not affecting the lower animals, contribute to produce error, when the respiration was nearly natural, the general average of the deficiency, in the total amount of common air inspired, was only about six parts in 1000, and in one instance considerably less than two. The smallness of this deficiency, say these chemists, surprised us very much; and it probably arises from the difficulty, or, as they elsewhere term it, the impossibility of always bringing the lungs to the same state after forcible expiration.

Under other circumstances, as in the experiment recited above, of respiration continued until the operator became insensible, these gentlemen conceive that oxygen is absorbed. To this inference, says Mr. Ellis, as far as it regards what is here called an absorption of oxygen, we must beg leave to object. That the united volumes of oxygen and carbonic acid expired were less than the total volume of oxygen inspired, we readily grant; but we deny that this fact affords any adequate proof of an absorption of this latter gas. To the chemist, indeed, the mere fact of the disappearance of a portion of oxygen may supply sufficient evidence of its absorption, in the sense in which he may choose to employ that term; but the physiologist farther requires to know, by what organs or vessels it is removed, in what course it is conveyed, and what uses it is destined to serve. On none of these points, however, does he gain any information; and all the anatomical knowledge which he possesses of the structure of the lungs, and of the properties of the living absorbent system, is adverse to such a doctrine. Should he apply to the chemist for a solution of his difficulties, he is told that oxygen does not chemically combine with other bodies, unless it be brought into actual contact with them; and he knows, that, in the present case, this contact is impossible, because the membranes, both of the air-cells and blood-vessels, are interposed between the air and the blood in the lungs. Even if, contrary to all experience and analogy, he were to concede to the chemist the existence of pores or other passages in the cells and blood-vessels, through which this oxygen might be attracted and combine with the blood, he is equally embarrassed to discover the reason or mode in which it is again so speedily expelled, or what useful purpose it can serve, since no portion of it is permanently retained. The science of chemistry furnishes no example of similar operations,—of fluids which attract gases and combine them, so as to reduce their elasticity, and then, without any apparent change of condition or circum-

stances, almost instantly discharge them in a new and elastic form.

If, farther, we compare the results of the two series of experiments made by Messrs. Allen and Pepys, the difficulties, in a physiological point of view, greatly accumulate upon us. For, if an *absorption* of oxygen really take place in the lungs, how does it happen, that, in the first thirteen experiments, made with several thousand cubic inches of air, and which occupied from ten to twenty-four minutes of time, a very small loss in the whole bulk of air, and not the smallest in its proportion of oxygen, occurred; while, in two other experiments, made with only 300 inches of air, and continued only for three minutes of time, a great deficiency in the whole bulk of air, and a loss of one-third of its oxygen, took place. In all these experiments, except the twelfth, in which, instead of loss, there was actually an increase of eleven cubic inches upon the bulk of air respired (Phil. Trans. 1808, p. 256.), the same person appears to have breathed, and the air was of similar composition. Consequently, the cause of variation in the result is to be sought, not in any difference in the animal organs, or in the original composition of the air, but, probably, in some circumstances of dissimilarity, which accompanied the progress of the experiment.

Now the bare statement of facts points out a great dissimilarity, not only in the chemical results, but in the circumstances accompanying the experiments, and in the effects which they produced in the system. For in the first thirteen experiments, which occupied from ten to twenty-four minutes, and in which no loss of oxygen occurred, the air was only *once* passed through the lungs, the breathing was nearly natural, the operator scarcely fatigued, and his pulse not raised more than about one beat in a minute. (Ibid. 253.) But in the two experiments in which oxygen is said to be absorbed, the same air was passed *eight or ten times* through the lungs; and, in less than a minute, the operator found himself obliged to take deeper and deeper inspirations. At last, the efforts to take in air became very strong and sudden, with a great sense of oppression and suffocation in the chest, indistinct vision, buzz in the ears, loss of recollection, and, at the end of three minutes, perfect insensibility. (Ibid. 260—262.) This difference in the effects produced in the system, we do not hesitate to ascribe to a difference in the *composition* of the air, which, in the first experiments, was respired in a natural state, but, in the two last, by repeated breathing, was rendered more and more unfit to carry on respiration, until, at length, its power of supporting that function altogether ceased.

But because under circumstances, in which the mental and animal powers were in complete abeyance, the respiratory organs were not able to make so complete an expulsion of the inspired air as they effect in their natural state of health and vigour, are we, therefore, entitled at once to conclude, that all the air which was not expelled was really *absorbed*? Setting aside the anatomical difficulties in the case, let us, for a moment, look only to the chemical consequences, to which such a conclusion would conduct us. If the mere disappearance of any gas, received into the lungs, be sufficient evidence of its absorption, then every gas, which is not returned, must be held to be absorbed. Are we then prepared to admit that hydrogen and nitrogen gases are absorbed by the blood? for, when their respiration is carried to its full extent, they, too, equally disappear. This supposed absorption, however, cannot proceed from the operation of chemical attraction, for little or no affinity subsists between these gases and the blood. Neither can it arise from the operation of the living system; for it occurs only

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when the living powers are about to cease. To us there appears but one way of escaping from these manifold difficulties, which is simply to conclude, that the inspired air, which is not returned, is retained in the cells of the lungs. Such a supposition dissipates at once all anatomical and chemical difficulties, and explains why no air disappears in natural respiration, when the expiratory powers are in full vigour and able to expel it, and why its disappearance increases in proportion as the actions of these powers decline and cease.

It is, however, worthy of remark, that, in these last experiments, not only was there a diminution in the whole bulk of air, but its relative proportions likewise varied; for, in 100 parts, the oxygen and carbonic acid amounted together only to about two-thirds of the usual quantity of oxygen, and the deficiency was supplied by a superabundance of nitrogen gas. We are not prepared to say why, in this very embarrassed state of the respiratory function, the relative proportions of the expired air should thus vary; but the fact proves only the retention of oxygen in the lungs, but not its absorption by the blood. Should it even be maintained that oxygen was absorbed, because, in these two experiments, a portion of it disappeared, then, by the same mode of reasoning, we must also contend, that, in the thirteen preceding experiments, no absorption of oxygen took place, because no part of it was retained; and as these last experiments alone come near to the natural exercise of this function, they authorize us to conclude, that such supposed absorption of oxygen constitutes no necessary part of healthy respiration. In truth, in some instances where a mixture of oxygen and hydrogen gases was respired, the oxygen and carbonic acid in the expired air uniformly exceeded, by one *per cent.* the total oxygen inspired (Phil. Transf. 1809, p. 425.); from which it may be inferred, that these variations in the proportions of the expired air proceed entirely from accidental causes, and are totally independent of any absorbent function in the lungs. Further Inquiry, v. 2. ch. 4.

If we are correct in representing that the air undergoes no diminution of volume in breathing, it will follow necessarily that no part of it can be absorbed in the lungs. This notion of absorption is not only at variance with the results of the most accurate direct experiments, but it is also repugnant to our knowledge of the structure of the lungs. The fineness of the absorbing vessels, the mucus perpetually lining the surface of the cells, the elastic nature of air itself, so that it neither penetrates moist paper, cloth, nor skin—all demonstrate that no air gets into the blood by this route. If, indeed, air were taken up by the absorbents, it must pass to the right side of the heart, and change the colour of the blood there, which does not happen.

But if, either by the function of absorption, or by the operation of chemical affinity, air did enter into the blood, we may surely with reason demand some proof of its presence; yet, says Haller, "Nulla unquam in vivo calido animali bulla aeris in sanguine visa est." (Primæ Lin. f. 306.) This opinion is confirmed by the direct experiments of Dr. Darwin; for having inclosed a portion of the jugular vein of a sheep between two ligatures, it was cut out, stripped of its adhering cellular membrane, and then thrown into a glass of water of temperature 100°, standing under the receiver of an air-pump. It at once sunk to the bottom, and did not rise when the air was exhausted; nor, when afterwards taken out, wiped dry, and laid on the floor of the receiver, did it exhibit any swelling under the exhaustion of the vessel. The experiment was repeated with a similar re-

sult on a portion of the vena cava of a pig. Phil. Transf. v. lxiv. p. 345.

Neither do the effects resulting from the admixture of æriform fluids with the blood, favour the notion of the entrance of air into that fluid. "Animal, cui aer in sanguinem infatur," says Haller, "perit certo et velociter; neque quidquam satis certi est in sanguinis vesarum pulmonalium aucto rubore." (Loc. cit.) This assertion is confirmed likewise by direct experiment. When Dr. Girtanner injected oxygen gas into the jugular vein of a dog, he cried dreadfully, breathed quick, and died in three minutes; when nitrogen gas was thrown in, death happened in 20 seconds. (Memoirs on Irritability, pp. 221. 223.) Air, says Bichat, thrown into the vascular system, quickly brings on agitation, convulsions, and death. (Recherches sur la Vie et la Mort, p. 179.) By forcing air through the wind-pipe into the lungs with a syringe, and confining it there, he has made it to enter into the blood-vessels, which immediately brings on agitation and exertion in the animal; and if an artery in the leg or foot be now opened, the blood will spring out frothy, and full of bubbles of air. If hydrogen gas has been used, the bubbles may be inflamed; and when this frothy blood has flowed 30 seconds, the actions of life cease, and cannot again be restored, even although fresh air be supplied. Ibid. 303. Inquiry, § 102, 103.

If, then, no proof exist of the passage of air into the blood by the ordinary course of the absorbent vessels, the only other mode of effecting this purpose that has been hitherto suggested, is the power of *chemical affinity*. What then are the chemical affinities subsisting between venal blood and atmospheric air? About the middle of the 17th century, Dr. Lower observed, that the upper surface of venal blood, received into a vessel, acquired a scarlet colour by exposure to the air; that if this surface was removed, the subjacent one was soon changed to the same colour; that if the cake of blood, after being allowed to settle in the vessel, was inverted, its exterior and upper surface speedily also assumed a florid hue; and, lastly, that if venal blood was shaken in a vessel, so that the air thoroughly intermixed with it, it became entirely florid. (De Corde, p. 178.) These opinions were afterwards held by Sig. Fracassati and Dr. Slare, the latter of whom observes, that the blood thrown up by a rupture of the capillary vessels of the lungs, is frothy and of a scarlet colour; the first of which effects he attributes to the intermixture of air, and the latter to its tinging power. (Lowthorpe's Abridg. Phil. Transf. v. iii. p. 235.) Mr. Hewson employed similar arguments to prove, that the florid colour, acquired by venal blood on exposure, was produced by the contact of the air; and, by injecting air into the jugular vein of a rabbit, he found that it there also rendered the blood florid. (Hewson on the Blood, p. 9.) M. Cigna not only confirmed the foregoing facts, but proved also that the change of colour in this fluid did not take place when the blood was covered with oil or placed *in vacuo*; and Dr. Priestley ascertained that not only by common air, but more especially by oxygen gas, this florid colour was produced on the black crassamentum of blood. On Air, v. iii. p. 66.

In effecting these remarkable alterations in the colour of the blood, the air itself, at the same time, suffers material changes. Dr. Priestley found, that in twenty-four hours oxygen gas was so far depraved by being in contact with venal blood, that one measure of it and two of nitrous gas occupied the space of a measure and a half, whereas, at the beginning of the experiment, they occupied the space of no more than half a measure. (Loc. cit. p. 75.) Dr. Good-

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wyn confined venal blood under a jar of oxygen gas inverted in mercury, and repeatedly observed that the change of colour was always very sudden, and, after several minutes, the mercury ascended two or three lines; from which he concluded that a small portion of the air had disappeared. (Essay, p. 61.) The precise change, however, which the air underwent, seems first to have been observed by Dr. Girtanner, who placed six ounces of venal blood in a jar of oxygen gas inverted in mercury; the blood presently assumed a florid colour; the air was somewhat diminished in bulk, and contained a portion of carbonic acid, which was attracted by lime-water. (Beddoes' *Obf. on Calculus*, &c. p. 219.) Dr. Boftock observes also, that a diminution of oxygen and production of carbonic acid take place when a piece of crassamentum is placed in a jar filled with oxygen gas. (On Respiration, p. 227.) The same production of carbonic acid occurs when blood is placed in contact with atmospheric air. A quantity of this fluid was received into a cup, and confined in a jar of air inverted in water, a glass of lime-water having been previously placed in the cup. The internal surface of the jar was soon bedewed with moisture, and a pellicle began to form on the lime-water, which, in a few hours, was increased to a thick crust of carbonate of lime. The crassamentum was then removed, and a fresh glass of lime-water was placed in the serum, which, in thirty-six hours, had acquired a crust like the former, and the water had risen considerably into the jar. In another experiment, where the serum was placed for twenty-four hours in a jar of air inverted in mercury, the residual air rendered lime-water milky, and the remainder had lost a part of its oxygen. A similar production of carbonic acid seems to have occurred, when, with a small diminution of the gas, a slight change of colour was produced on venal blood by placing it in contact with nitrous oxyd, in the experiments of Mr. Davy; for when a solution of strontian was admitted to the oxyd, it became slightly clouded, and, with the diminution of bulk that followed, minute portions of carbonic acid and nitrogen gas were produced. (Researches, pp. 377. 380. 387.) Hence then we learn, that when venal blood is exposed to the contact of atmospheric air, of oxygen gas, or of nitrous oxyd, it presently assumes a florid colour, and, at the same time, the volume of air is somewhat diminished, and a portion of carbonic acid is produced.

Does then the carbonic acid, which is here met with, proceed ready formed from the blood, or is it in part formed by the decomposition of the air? No one has yet proved that any aëriform fluid, much less that carbonic acid, exists naturally in the blood; and if this be true, no such aërial acid can be expected to issue from it. The carbonic acid also, is not formed by blood when it is confined in nitrogen gas; neither does the colour of the blood, in that case, undergo any sensible change; but this acid is formed by blood, either in oxygen gas, in nitrous oxyd, or in atmospheric air, all of which are deteriorated thereby; whence it follows, that without the presence of oxygen gas, the blood is unable to form carbonic acid, and that this acid, therefore, is, in part, formed out of that gas. If the oxygen gas that disappears do not contribute to form the carbonic acid that is produced, in what other manner can its loss be accounted for? or from what other source than the oxygen gas of the air, in contact with the blood, can that ingredient of the acid be derived? Those who suppose the carbonic acid to be furnished by the blood, independent of the air employed, must likewise suppose that the nitrogen gas is furnished by it also; for the experiments of Mr. Davy

teach us, that a portion of that gas, as well as of carbonic acid, is always present when nitrous oxyd is decomposed, which renders it probable that the same thing likewise occurs when air is changed by venal blood. But in what manner the blood should be able to furnish nitrogen gas, it is not easy to conceive, since no affinity exists between that gas and venal blood. (Davy's *Researches*, p. 375.) We infer, therefore, from these facts, that atmospheric air is decomposed by being placed in contact with venal blood, its oxygenous portion being in part converted into carbonic acid, and a quantity of its nitrogen being, in consequence, left free.

But, supposing the air to be thus decomposed by the blood, it still remains a question, whether it has been first attracted by that fluid, then decomposed, and afterwards in part expelled; or, whether the decomposition has been effected without such previous attraction and intermixture of air. The only evidence of this supposed attraction seems to be the small diminution of bulk, which the air in all cases suffers; but this cannot be considered as a proof of the attraction of the air; for it is a necessary consequence of that conversion of oxygen gas into carbonic acid, which has been shewn to take place, when these substances are brought into contact. Even granting to the blood this power of attracting air, or its oxygenous portion, it is not easy to conceive, why it should so readily lose it, and again give out this air in the form of carbonic acid. No change of quality in the blood, nor any variation of temperature, can have taken place sufficient to alter so rapidly its affinity for these substances: and it cannot proceed from a want of affinity between the blood and the carbonic acid that is formed; for that acid suffers a greater diminution, either than oxygen gas or atmospheric air, by being placed in contact with blood. We incline, therefore, to the opinion, that neither the air nor its oxygen gas is attracted by, and diffused through the blood, as happens with several gases when placed in contact with certain fluids: but that the air is decomposed, and its oxygen gas changed into carbonic acid, without entering into the substance of that fluid.

But, for the formation of this acid, the blood must supply carbon, since no other substance was present from which it could be derived: and it is well known also, that carbon enters largely into the composition of that fluid; and our experiments prove, that it exists as well in the serous as in the more solid parts. By some it may be objected, that because carbonic acid is formed directly by the combustion of charcoal, it cannot be produced at so low a temperature as exists in these experiments. To this we can reply only by an appeal to the general facts exhibited through the whole course of our enquiry, by which it appears, that both by the living functions of vegetables and animals, and by the decomposition of animal and vegetable matter, this acid is in like manner formed at temperatures equally low. Even those, who consider this acid to have proceeded ready formed from the blood, cannot attribute its production to the operation of heat; for in the animal body, the temperature of the blood seldom exceeds 100°—a degree of heat incompetent to form carbonic acid by any process analogous to combustion. The combination of many bodies is, indeed, greatly accelerated by being exposed to very high temperatures; but this surely does not set aside the fact of their spontaneous union at temperatures much more low. From this review of the effects, which take place between the blood and air, we conclude, that the chemical phenomena, which arise when the substances

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are placed in contact, do not prove an attraction and diffusion of air through the blood; but shew only that a reciprocal action takes place, by which a new product is formed: no inference, therefore, in favour of an attraction of air by the blood in the lungs, can be drawn from the reciprocal action which they exert on each other out of the body. Inquiry, § 96—100.

It is, farther, an objection to this supposed operation of oxygen, that in the lungs the blood and air do not come into contact, and therefore although the combination of oxygen with that fluid might be conceived to happen, when they are placed together out of the body, yet the intervention of organised membranes may be supposed to prevent such an union in the living system. In the ordinary operations of chemistry, such an interposition of animal substance would be considered sufficient to vitiate the result of any similar experiment in which it was employed; but in the application of this science to the living body, neither membranes nor blood-vessels are conceived to oppose any obstacle to the exertion of chemical action, or, in the smallest degree, to affect its result. In support of this supposed operation of oxygen on the blood, some experiments of Dr. Priestley have been appealed to, as affording decisive evidence that this substance has the power of penetrating a compact membranous body, and may, consequently, penetrate the cells and blood-vessels of the lungs. The importance, which has been attached to these experiments, in all the late hypotheses which have been proposed to explain the function of respiration, renders it necessary for us to examine them with some minuteness, in order to discover the true relation which they bear to the present question.

Dr. Priestley, who, as we shall hereafter see, supposed that venal blood became red by imparting its phlogiston to the air, knew well that the blood in the lungs was separated from the air by a membranous substance, which, however, according to Dr. Hales, does not in thickness exceed the $\frac{1}{1000}$ th part of an inch. To ascertain the effect of this circumstance, he put some black blood into a bladder moistened with a little serum, and then tying the bladder very close, he hung it in a free exposure to the air. The next day, all the lower surface of the blood, which had been separated from the air by the intervention of the bladder, had acquired a coating of a florid red colour, as thick, it appeared, as it would have acquired, if it had been immediately exposed to the open air; so that this membrane had been no impediment to the action of the air on the blood. This experiment was repeated, without previously moistening the bladder, and with the very same result. *Obs. on Air*, vol. iii. p. 369.

But although in these experiments the blood was rendered red by the agency of the air, yet we are not entitled to conclude, that this redness was produced by the combination of its oxygen, unless we can shew, not only that this substance comes into contact with the blood, but is likewise capable of changing it to a red colour. Dr. Priestley himself, who believed the blood to become red by the loss of phlogiston, could draw no such conclusion; and it is not a little remarkable that this philosopher, who had before so well observed the reciprocal effects produced in the air, when it thus changed the colour of the blood (*loc. cit.* p. 336.), should in these experiments have entirely overlooked them. It is still more remarkable, since these experiments have drawn so much attention, and seem now to be the chief or only remaining evidence urged in support of the hypothesis of oxygenation, that some attempt has not been made to inquire farther into the actual circum-

stances which attend them. It is this examination which we now propose to make, in the hope, that if it do not lead us to a knowledge of the true cause of this phenomenon, it may at least serve to shew to what it is not to be ascribed.

With this view, we procured a quantity of black blood, and putting it into a sheep's bladder, suspended it from the top of a jar containing about 100 cubic inches of atmospheric air. The jar was inverted in a saucer containing mercury, and within it a small cup of solution of potassa was likewise placed. The blood, in a short time, assumed a florid hue, and a dimness extended over the inside of the jar. By the next day, the mercury in the saucer had risen $\frac{2}{3}$ ths of an inch into the jar, and it continued to rise several days; so that by the fifth day it had reached nearly to an inch in height. The jar was then raised, and diluted acid being poured upon the alkaline solution, disengaged from it a large quantity of carbonic acid gas. By this experiment, therefore, we are taught, that, when black blood assumes a red colour by being thus placed in a moistened bladder, and exposed to atmospheric air, the air itself, at the same time, undergoes a change; for its volume is diminished, and carbonic acid is produced.

To ascertain these facts with greater precision, we put another quantity of black blood into a small bladder, and suspended it, as before, from the top of a small jar inverted in mercury, and which contained 18.3 cubic inches of atmospheric air. Under this jar also a small cup of solution of potassa was placed. The blood, as before, was soon reddened, and the jar became dim. In two days, the mercury had risen nearly half an inch into the jar, and by the close of the fourth day, it stood seven-eighths of an inch high, where it remained for some time quite stationary. On analysing the residual air, it was found to suffer no change, either from agitation with lime-water, or by being exposed to the contact of phosphorus; so that, though all the oxygen had disappeared, no carbonic acid was present, but that gas was entirely attracted by the water of potassa employed.

The capacity of the jar, in the above experiment, has been stated to be equal to 18.3 cubic inches; and the bladder, with its contents, together with the cup and solution, we found to occupy a space equal to 5.2, which reduces the actual bulk of air, employed in the experiment, to 13.1 cubic inches. The mercury which in consequence of the attraction of the carbonic acid had risen seven-eighths of an inch into the jar, occupied a space equal to three cubic inches; so that of the 13.1 inches of air originally employed, three had disappeared, and $\frac{10}{11}$ = $\frac{10}{11}$, or a portion of the air, was thus converted into carbonic acid, which comes very near to the proportion of oxygen gas which the atmosphere is known to contain. Hence we infer, that, in this experiment, all the oxygen gas that disappeared was converted into carbonic acid; and consequently we deny that any oxygen penetrated the bladder, in order to combine with the blood.

As thus it is denied that the blood, in these experiments, received any ponderable matter from the air, so likewise it will appear, from the facts which follow, that the air receives no such matter from the blood. We filled bladders with water, and suspended them in jars of atmospheric air, in the manner described above; and found that the oxygen gas of this air was converted into carbonic acid, in the same manner as when the bladders were filled with blood: and if the experiment was continued a sufficient length of time, the whole of the oxygen gas was, in like manner, made to disappear. The same effects followed from the introduction

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of moistened empty bladders; and, indeed, it is the usual effect produced in the air by every moistened animal substance. If, therefore, the moistened bladder be thus capable, by itself, of acting on the air, we are entitled to conclude that it exerts the same action when it is filled with blood; and as, on this supposition, the oxygen gas will unite with the carbon, furnished directly by the bladder, we have no ground whatever to suppose this carbon to come from the blood. Hence, therefore, when black blood is reddened by the air, through the coats of a moistened bladder, the air yields no oxygen to the blood, nor acquires from it any carbon; but the carbon of the bladder, by its combination with the oxygen of the air, passes into a state of carbonic acid gas. Further Inquiry, § 581—587.

That this change in the colour of blood is always accompanied by a corresponding change in the air, may be farther inferred from other experiments of Dr. Priestley. He found that, when the black crassamentum of blood was covered by serum or milk, it nevertheless acquired a florid hue, on being exposed to the air (*Obs. on Air*, vol. iii. p. 370.); and Dr. Wells observed, that a covering of albumen, also, did not prevent the action of the air on the blood. (*Phil. Transf.* 1797.) Now we know that serum and albumen convert the oxygen gas of the air into carbonic acid; and we found by experiment, that the same effect was produced by milk, as probably would be the case with most of the animal fluids. Hence it is evident, that when the blood, in the experiments of Dr. Priestley, became florid, through several inches of serum, the oxygen gas must have been at once changed by it into carbonic acid, and could never, therefore, in the form of oxygen, be conveyed through this fluid to act on the blood.

On the other hand, Dr. Priestley found a thin stratum of water to prevent entirely this action of air on the blood. (*Obs. on Air*, vol. iii. p. 370.) M. Cigna found the same thing to take place, when a pellicle of oil was interposed (*ibid.*); and Dr. Wells ascribes a similar effect to a solution of gum arabic. These substances, however, act little, if at all, in changing the air; and no change of colour, therefore, takes place in the blood. That black blood should have the power of attracting the oxygen of the air, through several inches of serum, and yet lose this power when a thin stratum of water is interposed, seems somewhat surprising, if the intervening fluid be, in each case, considered to be equally passive; but proceeding on the fact, that the serum exerts an action on the air, which the water is incapable of effecting, a new circumstance comes into view, and upon it the colouration of the blood may probably depend.

If, then, it appear, that the interposition of substances between the blood and the air necessarily prevents that contact, which is essential to the chemical union of oxygen with that fluid; if it also appear, that the colour of the blood is never, in such cases, changed, unless such substances be interposed, as are themselves capable of acting on the air; and if, lastly, it be proved, that when the blood exhibits this change of colour, the air suffers a change, and that its oxygen, instead of combining with the blood, is really contained in the carbonic acid that is formed, we must conclude, that, whatever be the mode in which the air contributes to change the colour of the blood, it cannot be by imparting to it any portion of its ponderable matter. Consequently, although these facts prove that oxygen gas possesses the power of changing the colour of the blood, as well through dead as through living animal membranes, yet they afford no evidence of the combination of oxygen with that fluid, but shew only the conversion of that gas into carbonic

acid, precisely in the same manner as this acid gas is formed, when the blood is reddened in the ordinary process of respiration.

Even when the air and blood are brought into contact, they only exert a reciprocal action on each other, by which carbonic acid is formed, but no oxygen appears to combine with the blood. We have already given various proofs, that, when the blood is changed in colour by the agency of the air, the oxygen gas of the air disappears, and carbonic acid is produced. These facts are confirmed by the experiments of M. Berthollet, who confined recent blood in a vessel of common air, and, at the end of twenty-four hours, the air, on analysis, afforded nearly $\frac{1}{10}$ of carbonic acid. In two other experiments, similar results were afforded; and in all these experiments, the acid gas produced was exactly equal to the volume of oxygen that disappeared. (*Mem. d'Arcueil*, tom. ii. p. 462.) Unless, therefore, it be maintained, that the same oxygen can, at the same time, exist in two combinations, we must suppose, that, in these experiments, no oxygen combines with the blood; and from whatever cause, therefore, the red colour of the blood may proceed, we may safely conclude that it cannot arise from the combination of oxygen. Further Inquiry, § 592—595.

Mr. Ellis considers that the diminution in bulk, which the respired air undergoes, according to the results of most investigations, may be accounted for by the condensation which oxygen experiences in uniting with charcoal to form carbonic acid. Crawford estimated this diminution at $\frac{1}{7}$ th, Lavoisier at $\frac{1}{5}$ th. But the experiments of Allen and Pepys (*Phil. Transf.* 1807), performed with a very perfect apparatus, and therefore apparently deserving confidence, do not support this notion of condensation. When they transmitted repeatedly oxygen gas over ignited charcoal, so as to convert it into carbonic acid, the volume was the same at the end of the experiment as at the commencement. The researches of these chemists on respiration, published since the appearance of the "Inquiry," making it very probable that there is no loss of bulk in the air respired, coincides with what they have proved concerning the constitution of carbonic acid.

Whether the azote of the inspired air undergoes any change?— Mr. Murray has brought together all that is known on this point, and arranged it so clearly, that we avail ourselves of his labours, without any further remark.

"It is lastly to be determined, what is the influence of the nitrogen of the atmosphere in respiration; and with regard to this, different conclusions have been formed. Lavoisier, in his early experiments, considered the nitrogen of the atmospheric air as suffering no change in respiration. *Mem. de l'Acad. des Sciences*, 1777. *Mémoires de la Société de Médecine*, 1783.

Priestley, in the experiments already referred to, in which he breathed the same air repeatedly, observed an apparent consumption of its nitrogen, as well as of its oxygen; but he afterwards inclined to the supposition, that the deficiency of nitrogen arose from the greater proportion of it in the lungs after the process than before.

Mr. Davy investigated this, and concluded that nitrogen is consumed in respiration; a quantity disappearing equal to about two-tenths of a cubic inch at each natural respiration, 13 cubic inches being the quantity of air taken into the lungs. As the number of natural inspirations amounted in a minute to 26 or 27, it followed that, in this time, 5.2 cubic inches of nitrogen are consumed; a result which was confirmed by continued respiration, as well as by the respiration of animals confined in a portion of air; though,

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though, in the latter case, the quantity consumed appeared to be less. *Chemical Researches*, p. 434.

This absorption of nitrogen in respiration appeared to be confirmed by other experiments. It was observed by Dr. Henderfon, in breathing a portion of air repeatedly from and into a gafometer. (*Nicholson's Journal*, vol. viii. p. 40.) And it seemed likewise to be established by the experiments of Pfaff. *Nicholson's Journal*, vol. xii. p. 249.

These experiments, however, are not free from fallacy, particularly those where the same quantity of air was repeatedly breathed; for, as Mr. Ellis has justly observed, (*Inquiry on Vegetation, Respiration, &c.* p. 114.) the respiration, as it proceeds, becomes more difficult and laborious, and is at length terminated by a feeble expiration, in consequence of which the due proportion of air is not thrown from the lungs. There appears, therefore, a diminution; and accordingly it is stated by Pfaff, that the diminution and the loss of nitrogen is always the greater, the longer the air is respired. There can be little doubt that the apparent diminution arises from this cause; and accordingly, in the experiments of Allen and Pepys, in which this source of error is avoided, there is no apparent consumption of nitrogen. The same result is stated to have been obtained in the last experiments of Lavoisier and Seguin, "there being neither any disengagement nor absorption of nitrogen gas during the respiration." (*Mem. de l'Acad. des Sciences*, 1789, p. 374.) From the experiments of Vauquelin, Spallanzani, and Ellis (*Inquiry, &c.* p. 87, 88.), it also appears that there is no sensible consumption of nitrogen, by the respiration of the lower orders of animals, while there is the usual consumption of oxygen, and formation of carbonic acid.

Messrs. Allen and Pepys, from some experiments (*Phil. Transf.* 1809), inferred, that there is even an evolution of nitrogen in respiration. They observed this, first, in the respiration of oxygen gas; in one experiment, where 3000 cubic inches of oxygen had passed through the lungs, 62 cubic inches of nitrogen being found in the first 260 cubic inches expired, though the gas originally contained only six cubic inches in this quantity; and in the next 562 cubic inches, 56 cubic inches were found, though this quantity, before it was respired, contained only 14; and a similar evo-

lution of nitrogen was observed in the repeated respiration of the same quantity of oxygen, an equivalent quantity of oxygen disappearing. Much of this loss of nitrogen may, as they observe, be ascribed to the intermixture of the residual air in the lungs; but from comparing the capacity of the lungs with the quantity of nitrogen evolved, they found more of it to be evolved than could be derived from this source; and were therefore led to the conclusion, that where oxygen gas is respired, a portion of nitrogen is given off from the blood. This conclusion appeared to be confirmed by the results of experiments on a guinea pig, confined in a quantity of atmospheric air. In one experiment, at the end of an hour and twelve minutes, the increase of nitrogen in the air was more than equal to the cubic contents of the body of the animal. In the respiration of a mixture of oxygen and nitrogen gases, a similar evolution of nitrogen, and disappearance of an equivalent portion of oxygen, was observed; but not in the respiration of atmospheric air.

Three thousand four hundred and twenty cubic inches of air, consisting of 2.5 azote, and 97.5 oxygen in 100 parts, were breathed for 7' 25": the expired air measured 3362, therefore the deficiency was 58. The expired air was received in 13 successive portions; of which N^o 1. contained, in 100 parts, 9 carbonic acid, 25 azote, 66 oxygen. N^o 13. consisted of 12.5 carbonic acid, 5.5 azote, and 82 oxygen, in 100 parts. When all the thirteen were mixed, the composition was 12.0 carbonic acid, 6.5 azote, 81.5 oxygen. The whole quantity of carbonic acid formed in this experiment was 396.78 cubic inches. The quantity of azote taken into the lungs was 85.50; the quantity expired, 263.10: the increase is, therefore, 177.60. (*Phil. Transf.* 1808.) In another experiment of a similar nature, 2668 of gas were breathed backwards and forwards for 13 minutes: it contained 4 *per cent.* of azote. There was a deficiency of 124 cubic inches in the expired air, the largest ever observed by these gentlemen. In this experiment there was an increase of 105.08 of azote. If the azote emitted from the lungs in these experiments be supposed to have been contained in those organs before the experiments began, it will make their contents more considerable than we had before calculated. The following is a summary of four experiments on this subject:

	Barom.	Therm.	Oxygen gas, &c. inspired	Gas expired.	Deficiency.	Time.	Quantity respired in a Minute.	Azote evolved.	Inferred capacity of Lungs.
N ^o 1.	—	53°	3260	3193	67	9' 20"	348	110	141
2.	30.3	70	3420	3362	58	7 25	461	177	225
3.	30.15	70	3130	3060	70	8 45	357	187	236
4.	29.4	51	2668	2544	124	13 0	205	105	133

The particulars of two analogous experiments on the guinea pig follow:

	Barom.	Therm.	Oxygen, &c. inspired.	Gas after the Exp.	Deficiency.	Carb. acid formed.	Carb. acid per Minute.	Time.	Oxygen missing.	Azote added.
N ^o 1.	29.05	57°	1060	1056	4	106.	1.48	1 ^h 12 ^m	54.07	50.12
2.	—	56	816	814	2	78.91	1.11	1 ^h 11 ^s	36.20	34.20

Philof. Transf. 1808 and 1809.

The conclusion that the nitrogen, found in these cases, is derived from the residual air of the lungs, is so probable, that it would at once be admitted, were it not that the quantity evolved is so large, as apparently to preclude its admission. Mr. Ellis, however, in some very ingenious observations on this question, has pointed out a source of fallacy to which there is every probability that the result is to be ascribed. It is, that the air in the lungs may be

in a condensed state, or occupy less volume than it would do when it is expired; and hence, in the respiration of oxygen, a larger portion of nitrogen derived from the residual air in the lungs may be given out than could be inferred from their known capacity. The structure of the lungs is cellular, and the air is diffused in cells of an immense number, and at the same time of diameters extremely small. If these cells have any degree of contractile power, this may pro-

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duce condensation of the air they contain. But independent of this, it is well known, as Mr. Ellis remarks, that a strong attraction or adhesion is exerted between air and the surfaces of all bodies; the more, therefore, the surface is increased, the greater must be the effect from this attractive force. Hence, under the extensive surface of the cells of the lungs, it must operate with great effect, and reduce considerably the volume of the air. The absorption of aerial fluids by charcoal, Mr. Ellis adduces as illustrating this operation of adhesion; and in the lungs it is sufficiently probable, that it may be aided by the affinity exerted by the humid surface to the aerial matter.

All the phenomena accord much better with this view than with the conclusion that nitrogen is evolved from the blood. Thus the "production of nitrogen is always greatest in the first expiration, and its quantity progressively diminishes, until towards the close of the experiment, it is reduced almost to nothing, circumstances which seem plainly to shew that nitrogen is no longer obtained when all the residual air in the lungs is removed. If this nitrogen were furnished by the blood independent of the residual air, no reason occurs why it should thus diminish, and cease to appear, as this air is abstracted; for the function of respiration goes on, and the blood, as far as depends on itself, cannot be considered less fit to supply nitrogen. The fact, also, that no such excess of nitrogen is furnished in natural respiration, militates against the notion of its proceeding from the blood. No excess of nitrogen, too, is ever afforded in other cases, unless its place be supplied by an equal or superior bulk of some other gas. And this affords evidence, that in this supposed evolution of nitrogen from the blood, nothing more than a mechanical substitution of one gas for another takes place." (Farther Inquiries, &c. p. 306.) Murray's System of Chemistry, 3d edit. v. 4. p. 498, et seq.

Adopting, as we do entirely, the views of Mr. Ellis on the subject of respiration (to whose clear, logical, and very satisfactory works we refer our readers for more ample information), we conclude our review of the changes, which the atmosphere undergoes in respiration, in the words of his "Further Inquiry," § 621.

"From the foregoing series of facts, concerning the respiration of the higher classes of animals, we feel ourselves entitled to repeat with increased confidence, that 'the whole of the oxygen gas which disappears in respiration is employed to form the carbonic acid produced in that process.' And that 'the nitrogen gas of the air neither suffers any change itself, nor produces any direct operation on the animal system.' Or, in the words of Messrs. Allen and Pepys, 'When atmospheric air alone is respired, no other change takes place in it, than the substitution of a certain portion of carbonic acid gas for an equal volume of oxygen.' (Phil. Transf. 1809, p. 427.) Consequently in man, as well as in the lower animals, the conversion of oxygen gas into carbonic acid constitutes the only essential change, which the air of our atmosphere experiences in the lungs during its respiration."

Aqueous Vapour contained in the expired Air.—That the air expelled from the lungs contains a certain quantity of watery vapour, is rendered very obvious by its condensation, when we breathe cold air. It is not very easy to ascertain its quantity.

Dr. Hales performed many experiments for this purpose: he contrived to pass the air which he expired through a flask filled with woodashes, which, in consequence of the potash contained in them, have the property of strongly attracting the moisture. By observing the increase of weight

which the acid had acquired in a given time, he estimates that the water emitted from the lungs in 24 hours, will amount to 7992 grains, above 20 ounces. (Statistical Essays, v. 2. p. 322—4.) The nature of his process, however, did not admit of much accuracy. Dr. Menzies attempted to solve this problem, by actually collecting in an allantoid fitted to the mouth, the water emitted from the lungs in a given time; his estimate is much less than that of Hales; he supposed that the quantity of water exhaled in 24 hours would amount to no more than 6 ounces, or 2880 grains. (Dissertation on Respiration, p. 54.) Mr. Abernethy, by breathing into a glass vessel of a peculiar construction, collected in an hour 180 grains of water, containing, as he supposed, a quantity of mucous matter. According to his estimate, the quantity emitted in 24 hours, would amount to exactly 9 ounces, or 4320 grains, but as the substance which he obtained was not pure water, there must be some deduction made from it on this account. We are not informed what proportion the water bore to the mucus dissolved in it. Surgical Essays, pt. 1. 141.

The difficulty of actually collecting and weighing the pulmonary exhalation, is probably the cause which induced Lavoisier in his experiments upon respiration, to ascertain its quantity by a calculation, founded upon the proportion between its constituent parts, compared with the composition of the other substances which are received into and discharged from the lungs. He first determined by direct experiment the quantity of oxygen consumed, and of carbonic acid produced; the composition of carbonic acid is known, and by comparing the oxygen which had disappeared with the quantity which would have been necessary to form the acid, he found that the oxygen consumed was more than sufficient to compose the carbonic acid which was actually produced. He supposed that this superabundant quantity of oxygen was employed in the formation of water, by uniting in the lungs with a portion of hydrogen: he estimates the amount of the water by knowing what quantity of it a given weight of oxygen can produce.

In the first memoir (1789), the quantity of water emitted from the lungs of a man in 24 hours, is stated to be no more than 337.18 grains. In the 2d (1790), this quantity is raised to 11180.57 grains, or nearly 2lbs. troy: and in the last experiments recorded by La Place, the quantity is still more considerable, viz. 13704 grains. The proportion between the water and the carbonic acid is very various in these different researches: in the first they are respectively 337.18 grains, and 17720.89 grains, or as 19 to 1000 nearly: in the second, 11188.57 and 8450.24, or as 1323 to 1000; and in the third, 13704 and 7550.40, or as 1815 to 1000. Such discordant results can have no other effect than that of diminishing our confidence in the whole of them.

Mr. Murray breathed into a bladder containing acetate of potash, a very deliquescent salt, and calculated the quantity of vapour expired by the increase of weight in the bladder and its contents, after the expired air had cooled. In this way he inferred that three grains of watery vapour are expelled from the lungs in a minute. Syst. of Chemistry, v. 4. p. 497.

There are two ways of explaining the production of the watery vapour expelled from the lungs: by evaporation of the mucous fluid covering the inner surface of the air-tubes and vesicles by the constant passage of the air to and from these parts, which are kept at a temperature of about 98°; or by exhalation from the pulmonary or bronchial blood-vessels. The secretion of the mucous membrane of the lungs must undergo evaporation, under the circumstances of

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its exposure to the atmospheric current in respiration, according to the ordinary operation of physical laws: this, therefore, seems the most probable source of the expired water.

Lavoisier conceived that the water is generated in the lungs; hydrogen being evolved from the venous blood, and uniting with a part of the oxygen of the inspired air. But this liberation of hydrogen is not supported by a single proof, or shadow of proof; and we have every reason to believe that all the oxygen consumed in breathing is employed to form carbonic acid.

III. *Changes produced in the Blood by Respiration.*—Soon after the doctrine of the circulation had been generally received, the distinction between arterial and venous blood was pointed out, and it was understood that this fluid is changed from the latter into the former state in the lungs. Various conjectures were referred to, to explain the nature and manner of this change. Some considered the alteration to be principally mechanical; conceiving that the blood, while in the pulmonary vessels, experiences a continual and violent agitation, by means of which, its particles, before loosely mixed, and confining of several heterogeneous substances, are communicated and perfectly united together, so that the whole mass acquires an uniform consistence. Baglivi supposed, that the blood was rarefied, and Helvetius, that it was condensed in the lungs; Boerhaave thought that its particles acquired that peculiar organization, which he deemed essential to the existence of perfect blood. Other philosophers, as Harvey, Boyle, Hales, and Haller, were of opinion, that the blood emitted some noxious or superfluous matter in its passage through the lungs. Some again supposed, that the change from venous to arterial was caused by something imparted from the air to the blood.

These vague speculations were soon superseded by the more certain information deduced from experiment and observation. We have already enumerated the proofs afforded by the researches of Lower, Cigna, Priestley, Lavoisier, Davy, and others, that the change of the blood from venous to arterial is effected by exposure to the oxygenous gas of the atmosphere in respiration; and that a similar change, in colour at least, is effected by such exposure out of the body: the alteration being accompanied, in both instances, with a change in the composition of the air.

The proofs, that respiration is the source of the change in colour just alluded to, that it is stopped in living animals when breathing is interrupted, and goes on again when the respiratory process is resumed, will be found in the article LUNGS.

But is there no other alteration in the properties of the blood consequent on respiration, besides its change of colour? Undoubtedly there must be such further alteration, for life is quickly ended, if this conversion of venous into arterial blood be stopped; and we shall presently state our opinion, that carbon is exhaled from the pulmonary vessels; but chemistry has not yet shewn us any difference of composition between the two kinds of blood.

“When (says Mr. Murray) we examine chemically the properties of arterial and venous blood, we find no other difference between them than that of colour. They contain the same principles, and are subject to the same changes from chemical agents. The difference of colour, however, points out some difference in composition, though it may be too slight to be discovered by analysis; and when we examine the phenomena of respiration, which are intimately connected with the change of venous to arterial blood, we find, that such a difference must exist.” *System of Chemistry*, vol. iv. p. 489.

Even the changes of colour of the blood are not well understood. We know that this fluid is converted from the scarlet to the black state, in the course of its passage through the capillary vessels of the body. But it undergoes the same change, when extravasated from a large artery, or when confined in an arterial tube between two ligatures. It never seems, however, to suffer the opposite change, except when in contact with oxygen gas, or with some substance capable of furnishing it.

That the passage of the air through the lungs in respiration is instrumental in converting the chyle and lymph, poured from the thoracic duct into the venous system, into blood; or, that it produces fibrine from the materials just mentioned, has been supposed and asserted; but without any direct proof. We cannot, indeed, see the chyle in the blood after it has gone through the lungs; but we know of nothing further than a mechanical admixture; and are completely ignorant of the circumstances accompanying and determining the generation of fibrine.

IV. *Theories of Respiration.*—The principal explanations of the phenomena detailed in the preceding divisions of this article, as exhibited in the air and blood, consequent to respiration, are detailed by Mr. Murray, in his *System of Chemistry*, vol. iv.; where they are followed by his own views of the subject.

Dr. Priestley, says he, considered these phenomena as owing to the disengagement of phlogiston from the blood in the lungs, and its combination with the air (*Philos. Transact.* 1776); a theory modified and rendered more comprehensive by Crawford (*Experiments and Observations on Animal Heat*). Regarding hydrogen as the phlogistic principle, and supposing it to exist in the blood in that state in which it is disengaged from vegetable substances by heat, the heavy inflammable air of the older chemists, the carburetted hydrogen of the modern nomenclature, he supposed that this hydro-carbon, as it was named, is communicated to the blood in the extreme vessels, by which the conversion from the arterial to the venous state is occasioned; in the lungs, he concluded, it is given out, and in its nascent state, or its transition to the elastic form, it combines, he supposed, with the oxygen of the air, and forms the carbonic acid gas and watery vapour expired, while the blood, deprived of its hydro-carbon, returns to the arterial state. The same explanation nearly was given by Lavoisier; at least he advanced the opinion, that the carbonic acid gas and watery vapour of the expired air are formed by the combination of carbon and hydrogen from the blood with oxygen in the lungs.

Lavoisier had also suggested, that the combination of oxygen with carbon might take place in the course of the circulation (*Mem. de l'Acad. des Sciences*, 1777, p. 191.), that the oxygen which disappears in respiration may be absorbed by the blood, while carbonic acid may be given out fully formed. This hypothesis was afterwards endeavoured to be established by Haffenratz and Lagrange (*Annales de Chimie*, tom. ix. p. 261.) They observe, that venous blood exposed to oxygen acquires a vivid red colour, which soon changes to a purple hue; and that arterial blood placed in vacuo, or in contact with any gas which does not contain oxygen, quickly assumes the dark purple colour. They conclude, therefore, that the florid red colour of the blood is the result of the absorption of oxygen, while the dark venous colour arises from the intimate combination of that oxygen with a portion of the carbon and hydrogen which the blood contains. According to this theory, oxygen is absorbed by the blood in the lungs, remains in the arterial blood for a time in a state of solution, or loose combination,

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ination, but it gradually passes, in the extreme vessels, into more intimate combination with carbon, forming carbonic acid, in consequence of which the blood passes to the venous state; and from this venous blood the carbonic acid is disengaged in the lungs, and a new portion of oxygen absorbed.

These two hypotheses have divided the opinions of physiologists. They are both, however, defective: their principles are not proved, and they involve suppositions incompatible with the laws which appear to regulate the chemical actions that proceed in the animal system. No proof is given, in the system of Crawford, of hydro-carbon being communicated to the blood in the extreme vessels; nor is it easy to imagine any source whence this principle in an insulated state can be derived; for, although it has been imagined by Crawford, that it may have its origin in the solid parts of the system being absorbed, this is refuted by the considerations, that this absorption is performed not by the veins, but by the lymphatics; that it is not sufficiently uniform, nor limited to carbon and hydrogen; that to whatever extent it may be carried, the blood must, in a state of health, deposit as much as is removed; and that there is no evident cause by which the carbon and hydrogen can be separated from the other elements, and be brought into binary combination. And, in the theory of Hallenfratz, though it were granted, that a portion of oxygen is absorbed by arterial blood, there is no proof that this is combined merely with carbon, and that carbonic acid, the result of this combination, is contained in venous blood. We have even proof that the latter supposition cannot be just; for, when arterial blood is exposed to carbonic acid gas until its colour is darkened, it does not recover its florid hue from subsequent exposure to oxygen (Priestley, Experiments on Air, vol. iii. p. 363. 365.), and is therefore not venous blood.

Neither are the changes which these hypotheses suppose, analogous to the usual chemical operations of the animal system, or sufficiently connected with the purposes which the blood serves in its circulation. They both suppose, that the changes which the blood undergoes, depend not on alterations in its composition, strictly speaking, but on the alternate communication and abstraction of a principle held by it in a state of solution, and which appears to serve no purpose in the animal economy, but is assumed merely to account for the phenomena of respiration. But when the general facility of combination in the principles of animal matter, and the tendency which the actions of the vessels have to form them into ternary or quaternary compounds, are considered, there is little probability in the supposition of the one hypothesis,—that oxygen should be absorbed by the blood in the lungs, without immediately altering its composition; that, without being attracted by any of the other principles of the blood, or influenced by the other chemical changes going on in the system, it should be merely combined with carbon, in the proportion necessary to form carbonic acid; and that this carbonic acid, without affecting the ultimate composition of the blood, should be carried the whole length of the venous circulation, and thrown out at the lungs; or in those of the other, that carbon and hydrogen should be brought into a state of binary combination in the extreme vessels, and should be held merely dissolved by the venous blood, until acted on by the oxygen of the air in respiration.

Still less are these changes connected with the known changes which the blood suffers; for no relation is traced between the processes of assimilation or of secretion, and the supposed communication of hydro-carbon, or the combination of carbon and oxygen, in the extreme vessels. In the

theory of respiration, the conversion of arterial into venous blood ought to be considered as connected with these processes; and this conversion, as well as that of venous into arterial blood, must be regarded as arising from changes in the ultimate composition of the known proximate principles of the blood, and not from the alternate communication and abstraction of a principle which it holds dissolved in it, or in what is termed a state of loose combination. According to this view of the subject, Mr. Murray gives the following explanation of these phenomena.

The blood is the source whence the animal products are formed. Its expenditure is supplied by the chyle, a fluid less completely animalized than the blood itself. The peculiar character of animal matter, with regard to composition, is a large proportion of nitrogen, and a diminished proportion of carbon. It may therefore be inferred, that in the extreme vessels, where the animal solids and fluids are formed, the general process will be the separation from the blood of those elements of which animal matter is composed; and that, of course, carbon, which enters more sparingly into its composition, will exist in the remaining blood in an increased proportion. This is accordingly the general nature of the conversion of arterial into venous blood. Nitrogen, hydrogen, and other elements, are spent in the formation of new products, and the proximate principles of the blood, probably the crassamentum chiefly, remain with an increased proportion of carbon. In this state it is exposed to the atmospheric air in the lungs, the oxygen of which abstracts its excess of carbon, and forms the carbonic acid expired, and this constitutes the conversion of venous into arterial blood.

There is little reason to suppose, that any combination of the oxygen of the air with the hydrogen of the blood takes place. The supposition that it does, and that this is the source of the watery vapours expired, originated in the hypothesis of Crawford, which supposed hydro-carbon to be disengaged from venous blood. No fact has been stated in its support; it is a combination which can apparently serve no purpose in the animal economy; for hydrogen exists in as large a proportion, (and even in a larger,) in animal as in vegetable matter. And the degree of evaporation from a moist surface, so extensive as that of the internal surface of the lungs, at the temperature of 96° , is adequate to account for the whole of the watery vapour expired.

The conversion of arterial into venous blood, is thus considered in connection with the other chemical changes going on in the system, and is subservient to them. In the extreme vessels, the constituent principles of the blood are expended in the nourishment of the solid fibre; in the formation of the secreted fluids; and in the support perhaps of the living powers. Of these principles, carbon is that contained in the smallest proportion in the solids and fluids; it is, therefore, that of which there is the least expenditure, and consequently it must be present in a larger proportion in the blood, after it has undergone these changes. To preserve the due proportion, and prevent it from accumulating, it must be discharged by some other process. Hence the necessity of the application of oxygen to the blood in the lungs, and the origin of the carbonic acid which is uniformly discharged. We thus, too, trace the process of animalization from the reception of the aliment to its completion. All animals live directly or indirectly on vegetable matter. The principal difference in the composition of vegetable from that of animal substances, is in the former containing a larger proportion of carbon. Respiration is the function by which this difference is established. The aliment received into the stomach, is soon formed into a fluid capable of assimilating

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with the blood. It is conveyed to the lungs, and loses part of its carbon, or is partially animalized. It is then distributed through the system, and, in the extreme vessels, along with carbon, parts with so much hydrogen, oxygen, nitrogen, and other elements, as to leave carbon predominant.

It might be supposed, that in any view, such as that which has been now given, there must be some difficulty in conceiving that oxygen gas should combine with carbon with so much facility, at a temperature much lower than that which is in general necessary for their union, and this, too, with the intervention of the coats of the vessels through which the blood circulates. On attending, however, to the objection, it will be found to have no real force. Although carbon, in its solid and insulated form, requires to be raised to a high temperature to cause it to combine with oxygen, yet when it makes part of a ternary or quaternary combination, in which state its cohesion no longer opposes the combination, it is abstracted, and combined with oxygen at any natural temperature. It is thus that many vegetable and animal substances, when humid, are altered by exposure to the air, and carbonic acid formed. Blood itself is acted upon in this manner. It suffers a change precisely similar to that which it undergoes in the lungs, and this more or less rapidly, and to a greater or less extent, according to the quantity of oxygen present, and the degree of agitation used. Arterial blood was exposed by Fontana to atmospheric air for three minutes, when no perceptible alteration was occasioned in the purity of the air: they were then agitated together for three minutes: the volume of air was diminished and its purity impaired. When oxygen gas was substituted for atmospheric air, the alteration was still more considerable, its purity being diminished when agitation was avoided; and when it was agitated, the diminution in purity and volume was still greater. In all these experiments, carbonic acid was also produced. (*Opuscules Physiques*, pp. 334, 335.) They therefore prove, that oxygen can attract carbon from arterial blood. With venous blood, the formation of carbonic acid is, according to Luzariaga, still greater. (*Dissertatio Inauguralis*, p. 53, 54.) If, therefore, oxygen can abstract carbon from the principles of the blood, under such circumstances, it is evident it must do so still more rapidly during respiration, where the circumstances are so much more favourable, where there is comparatively a high and uniform temperature kept up, where the blood is exposed on an extensive surface, and in a state of extreme division, and where that surface, as well as the air itself, are rapidly renewed.

Nor can it be supposed, that the thin membrane which forms the coats of the vessels through which the blood circulates can oppose an obstacle to this reciprocal action. Every humid substance is permeable through its whole substance to elastic fluids, and is penetrated by them. Animal membrane, in a much denser state than that which forms the coats of the extreme blood-vessels, is, when humid, pervious to gaseous fluids; and what is in point in the present case, through such membranes, when humid, oxygen can act on blood, and communicate to it the florid colour, the same as when blood is freely exposed to it. Thus, Priestley found by experiment, that if a quantity of black blood were inclosed in a moistened bladder, which was tied very close, on hanging it in a free exposure to the air, it acquired "a coating of a florid colour, as thick as it would have acquired if it had been exposed to the open air; so that this membrane had been no impediment to the action of the air on the blood." Mr. Hunter mentions a similar experiment: "I covered," says he, "the mouths of vessels filled with venous blood with gold-beaters' skin, touching the surface of

the blood, and the blood constantly became of a florid red on the surface, and even for some depth." (*Treatise on the Blood*, p. 62.) Nor is there any reason to believe, as has been contended, that in the living solids this property is suspended, for it is one connected merely with mechanical structure, and the influence of humidity. The blood, therefore, may be considered, when circulating in vessels so fine, as exposed to the action of oxygen nearly as if no membrane were interposed: a part of that oxygen approximated to it will combine with a portion of its carbon, and the carbonic acid, when formed, will, from its elasticity, recede and be discharged. The whole action is purely chemical, and precisely the same as that which is exerted between air and blood out of the body, favoured only by the circumstances of exposure, temperature, and agitation, under which it takes place." P. 502.—510.

After adverting to the arguments, by which it is shewn that no gas can pass through the membranes of the bronchial cells and pulmonary vessels from without, nor any substance pass from within through these parts, to unite in the lungs by ordinary chemical affinity, consequently that the carbonic acid is not formed by the union of carbon and oxygen in the blood; and to the facts, in which carbonic acid is formed in the lower animals and even in man, by the skin, where we have no proof of any absorption of oxygen, or passage of it through the animal textures, Mr. Ellis declares his opinion, in which we entirely coincide, that the carbon supplied in human respiration is truly an animal excretion, performed by the exhalent vessels, which exist in such wonderful numbers in the lungs; consequently, that it depends primarily, like other excretions, on the due circulation and distribution of the blood, and is more or less affected by all its variations. The changes in its quantity have been found very considerable, according as the individual was at rest or in motion, fasting or with a full stomach, &c. in the experiments already noticed of Lavoisier and Seguin. We conceive, then, that the carbon, thus exhaled or excreted in the lungs, combines in the air-cells with the oxygen of the atmosphere to form the carbonic acid expired.

As the emission of carbonic acid in respiration is carried on through the whole period of living action, and is essential to the continuance of it, some ulterior source must be provided, from whence its supply may be duly maintained.

"To the organs of digestion, assimilation, and secretion alone, we are enabled to trace it; but the mode in which it is reduced to that state in which it is afterwards expelled by the surfaces of the lungs and skin, involves a knowledge of the nature and qualities of our food, of the various and successive changes which it is made to undergo in the system, and of its distribution by the blood to the different organs of secretion, according to the several uses which it is afterwards destined to answer: concerning all of which subjects, we have of late succeeded in getting rid of much error and absurdity, but have not in any instance attained to complete knowledge." *Ellis's Inquiry*, ch. 5.

V. *On the Respiration of the different Gases.*—No æriform fluid, says Dr. Boistock, except the compound of oxygen and azote which exists in the atmosphere, is adapted to the permanent support of life. Of the other gases, there are some which, on account of their irritating nature, it is absolutely impossible to receive into the trachea; these properly constitute the nonrespirable gases. There are, however, others which it is possible to inspire, though their employment is followed sooner or later by the extinction of life. We shall detail some of the principal experiments that have been performed on this subject, as the nature of the change produced

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duced upon the blood by common respiration may be in some measure illustrated, by observing the effects which follow the use of the other gaseous bodies.

Soon after the discovery of the power which the oxygenous part of the atmosphere possesses, of supporting animal life, several trials were made of the effects which would result from breathing it in an unmixed state. The accounts given by those who were the subjects of these trials were various; Dr. Priestley, who first made the experiment, conceived that he felt an agreeable lightness in the chest (*Obs. on Air*, v. ii. p. 162.); some persons supposed that it produced exhilarating effects upon the system, while others imagined that the employment of this gas was followed by uneasiness and pain about the region of the thorax. These different sensations must be attributed, in a great degree, to the effects of imagination; in part, however, they may be ascribed to the gas which was employed in the earlier period of the pneumatic experiments having been often in an impure state, mixed with acid, acrid, or metallic particles. A difference in the effects produced by the respiration of the gas, ought perhaps, in some degree also, to be imputed to the manner in which it was received into the lungs, whether only in small quantities, or by deep and laborious inspirations, and whether it was employed in a condensed or a rarefied state.

As Dr. Priestley was the first person who, himself, respired oxygenous gas, so he was likewise the first who observed the effects which it produced upon animals altogether immersed in it. His experiments were performed upon mice; they decidedly proved the power which this gas possesses of supporting animal life, but no other certain conclusions can be deduced from them. M. Lavoisier afterwards turned his attention to this subject, and in the experiments upon guinea pigs, to which we have already referred, he noticed with more accuracy the effects resulting from the respiration of oxygen. He examined the state of the internal organs of animals which had been for some time confined in this gas, and he conceived that a degree of redness and turgescence of the vessels was produced, and other effects which indicated that the sanguiferous system had been in a state of increased action. (*Soc. Roy. de Médecine*, 1782, 1783, p. 576.) There is, however, reason to infer, that in this case, either the gas employed was in an impure state, or that there were some circumstances attending the situation of the animals, or the manner in which the experiment was conducted, which affected the results, for the same philosopher, in the subsequent memoir of 1789, where there appears to have been the greatest attention to accuracy, and where the most perfect apparatus was employed, forms entirely opposite conclusions. In this paper, we are informed, that he confined guinea pigs in pure oxygen, and in mixtures of oxygen and azote, in different proportions, until the former constituted only one-fifteenth part of the compound. In all these cases, he found that the same quantity of oxygen was consumed, a circumstance, he observes, in which respiration differs remarkably from combustion, though, in many respects, these operations are similar to each other. The effects produced upon the animals were precisely the same, whether they were confined in pure oxygen, or in any of the mixtures of it, except that when the proportion of azote was very large, they exhibited marks of drowsiness. The author expressly informs us, that neither the temperature nor the circulation were in any respects affected by the inspiration of pure oxygen for the space of several days. (*Acad. des Sciences*, 1789, p. 573.) These experiments must be considered as very

valuable; there is no reason to doubt their accuracy, and they may be relied on with more confidence, as the author seems to have had no peculiar theory in view when he performed them; indeed the results are different from what we might previously have expected, and are unfavourable to the analogy which Lavoisier had always endeavoured to establish between respiration and combustion.

We have an account by Dr. Higgins of the respiration of pure oxygen by the human subject; in one experiment, thirty-eight pints of this gas were respired without interruption. No inconvenience was experienced, a sense of warmth was, however, produced in the chest, and the pulse was considerably quickened, (*Minutes of a Society*, &c. p. 144-6.) Dr. Higgins, in a second experiment, breathed a quantity of oxygen under an additional pressure, and by very full inspirations. He conceived that by these means its consumption was much promoted (*ibid.* 152.); but more numerous and accurate experiments will be required before this inference can be fairly established. *Essay on Respiration*, p. 139-144.

In the year 1794, Dr. Beddoes published his experiments upon this subject. (*On Factitious Air*, pt. i. p. 13.) They were performed upon rabbits, and the attention was principally directed to an examination of the state of the internal organs of the animal, after it had been subjected for some time to the influence of pure oxygen. In detailing the results, we see such obvious marks of the influence of the author's pre-conceived notions, that our confidence in them is much diminished; and this unfavourable impression is strengthened by finding that they do not coincide with the reports of other very accurate observers. See *Bohock on Respiration*, p. 144, et seq.

Mr. Davy has also recorded some trials, which he made with oxygen gas; the results of which, so far as they regard the chemical changes of the air itself, we have noticed in a previous part of this article. *Researches*, p. 444.

Messrs. Allen and Pepys made some experiments on the respiration of oxygen. The pulse was raised about 15 beats in a minute, a gentle glow and perspiration were produced over the whole body, and nothing else remarkable occurred. The respiration of the gas was continued about ten minutes in these trials; and the effects soon subsided. We have detailed the results of their observations concerning the changes of the air, in that division of this article in which the quantity of carbonic acid, produced by breathing, is mentioned.

It thus appears that we have no direct proof that the respiration of oxygen, for a short period, is injurious to the animal economy. Whether a much longer use of the gas would be hurtful, and what peculiar morbid action or condition of parts would be induced, we have no means of determining.

Among the remaining respirable gases, that which appears to be the least injurious to the living body is the oxyd of azote. This aëriiform fluid was first discovered by Dr. Priestley, and was by him supposed to be "in the highest degree noxious to animals." (*Obs. on Air*, v. ii. p. 55.) The society of Dutch chemists, who afterwards examined its properties with more accuracy, coincided with Dr. Priestley, as to its effects upon animal life. (*Journal de Physique*, t. xliii. p. 329.) The experiment was, however, repeated by Mr. Davy, and he discovered not only that this gas may be respired for a short time without inconvenience, (four or five minutes,) but that the employment of it is succeeded by a singular excitement of the nervous system, which differs from that produced by alcohol and

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opium, in not producing a subsequent state of exhaustion. The description of its effects in the "Researches" is very interesting. Mr. Davy infers from his experiments, that this gas is absorbed in large quantities by the venous blood. This blood, when exposed to the gas out of the body, becomes of a brighter purple, and carbonic acid is formed. We have no doubt, therefore, that carbonic acid is formed when this gas is respired; the gas being decomposed, so that the carbon of the venous blood can unite with its oxygen. We have already spoken at length against the notion of any air being absorbed by the blood in breathing; and we may refer to Mr. Ellis's Inquiry, chap. iv., for satisfactory arguments against the supposed absorption of this gas in particular.

Hydrogenous gas has been frequently respired, and it is now pretty generally agreed, that it is altogether passive when received into the lungs, and that death succeeds the employment of it in consequence of the exclusion of oxygen, in the same manner as by suffocation, or drowning. M. Lavoisier distinctly ascertained this fact, in his experiments related in the memoir of 1789, and it has been since confirmed by Mr. Davy. (Researches, p. 466.) It must be remarked, however, that a contrary opinion respecting the effects produced by the respiration of hydrogen has been maintained by some eminent chemists, even by Dr. Priestley himself (Obs. on Air, v. i. p. 229.); but his experiments were made in the earlier period of the pneumatic chemistry, when the gases were frequently employed in an impure state, and the experiments of Mr. Davy clearly demonstrate that hydrogenous gas produces different effects upon the system, according to the substances from which it is procured.

The experiments that have been made upon the subject of azotic gas are few and imperfect; it has been generally supposed, that it exercises no noxious effects upon the blood, but, like hydrogen, destroys life simply by preventing the access of oxygen. Dr. Higgins indeed remarks, that an animal dies sooner when immersed in this gas, than from the simple interruption to respiration (Minutes of a Society, p. 133.); but we are not informed upon what data this opinion is founded. Mr. Davy likewise experienced the sense of suffocation more speedily from the use of azote, than from that of hydrogen, but it appears that the gas employed in the experiment contained a quantity of carbonic acid, to which we may, with great probability, ascribe its noxious effects; and the same philosopher, when speaking in general terms of the action of azote in respiration, seems to consider it as merely excluding oxygen. This opinion is adopted by Dr. Thomson, and was uniformly maintained by M. Lavoisier. It would certainly appear reasonable to conclude a priori, that a substance which enters so largely into the composition of the atmosphere, and which consequently composes so great a proportion of the contents of the lungs, could not exercise any noxious effects upon the animal system.

The only remaining gases which can be received into the lungs are the carbonated hydrogen or hydro-carbon, sulphurated hydrogen, and carbonic oxyd. They occasion death immediately, but produce some change in the blood. If hydro-carbon be inspired in an undiluted state, it is followed by instant death; and when employed in small quantity only, mixed with atmospheric air or with oxygen, if it be used for any length of time, it induces vertigo, dimness of sight, convulsions, loss of sensation, and, in short, every symptom of approaching dissolution. It evidently acts more rapidly and powerfully than those gases which merely exclude oxygen from the blood, and must consequently be considered as exercising a positively noxious influence upon the animal economy. For an account of the respiration of

sulphuretted hydrogen, see the Journal de Physique, vol. lvi. p. 35.

All the remaining gases are found to be strictly non-respirable, i. e. incapable of being admitted into the trachea. It is obvious that this must be the case with the irritating acid or alkaline gases, and with the nitrous gas, which, during its passage into the lungs, must unavoidably be brought into contact with oxygen, and thus produce nitrous acid vapour. The only substance, respecting the respirability of which there could be any doubt, is the carbonic acid gas, which, though possessed of the decided characteristics of an acid, exhibits them in a much slighter degree than that in which they generally exist. The impossibility of taking it into the lungs, even by the most powerful voluntary efforts, when it composes a large proportion of the air, was, however, proved by the experiments of M. Pilatre de Rozier, executed with that intrepidity which formed so remarkable a trait in the character of this philosopher. Bostock's Essay, p. 149—153.

He went into a brewer's tub, while full of carbonic acid gas, evolved by fermentation. A gentle heat manifested itself in all parts of his body, and occasioned a sensible perspiration. A slight itching sensation constrained him frequently to shut his eyes. When he attempted to breathe, a violent feeling of suffocation prevented him. He sought for the steps to get out; but not finding them readily, the necessity of breathing increased, he became giddy, and felt a tingling sensation in his ears. As soon as his mouth reached the air, he breathed freely, but for some time he could not distinguish objects: his face was purple, his limbs weak, and he understood with difficulty what was said to him. But these symptoms soon left him. He repeated the experiment often, and always found, that as long as he continued without breathing, he could speak and move about without inconvenience; but whenever he attempted to breathe, the feeling of suffocation came on. Journal de Physique, vol. xxviii.

Blumenbach made an experiment on three dogs of nearly the same size, to shew in a comparative view how long three different aerial fluids could support life. He prepared a bladder with a pipe attached to it, and holding about 20 cubic inches. This, filled with oxygen, was tied in the trachea, and the animal died in 14 minutes. The second animal perished in six minutes, when the same bladder, filled with atmospheric air, was placed in the same way in the trachea. The bladder containing the air, at the end of the last experiment, was put into the trachea of the third animal, which died in four minutes. Infit. Physiolog. 1798, p. 114, note g; or more at length in his Medicinische Bibliothek, vol. i. p. 174, et seq.

VI. *Effects produced on the Air by the Respiration of Animals.*—The results of observation warrant us in asserting that no living being can subsist long without a supply of fresh air. That insects die, when their stigmata are covered with oil or honey, has been long known. "Oleo illito insecta omnia exanimantur," says Pliny. Mr. Derham found that wasps, bees, hornets, and grasshoppers, seemed dead in two minutes, when placed under the exhausted receiver; but revived in two or three hours, on being restored to the air, even although they had remained in vacuo 24 hours. (Physico-Theology, p. 8, 7th edit.) Snails survived several hours in the exhausted receiver, newts two or three days, and leeches five or six. (Hutton's Math. Dict. art. *Air-pump*.) Zoophytes, according to Davy, require air in the water which they inhabit, and act on it like fishes. (Beddoes's Contributions, p. 138.) When some pepper-water had remained in vacuo 24 hours, some of its animalcules

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were dead, and some alive. (Phyfico-Theol. p. 8.) Spallanzani never found any animalcules produced in vegetable infusions in vacuo. When infusions, containing animalcules, were placed under the exhausted receiver, they lived many days, but perished sooner than others of the same kind in the open air. (Tracts, p. 1, 2.) Hooke found that the eels of vinegar died in a very short time, when the fluid was put into a phial, and stopped close. (Microgr. p. 217.) Scheele inclosed leeches in a phial, with a little air: they lived only two days, although they would have lived as many years, if the water had communicated with the air. Mr. Ray remarked, that fishes cannot live in water without air: they will live in a vessel of water with a narrow mouth for months or years; but if the vessel be stopped, so as wholly to exclude the air, or interrupt its communication with the water, they will be suddenly suffocated. (Wisdom of God in the Creation, p. 81.) Dr. Priestley confined several small fishes in a vessel, containing three pints of rain water, that had been previously well boiled to deprive it of its air, and they lived only between three and four hours. (Obs. on Air, vol. v. p. 139.) Mr. Davy introduced a large thornback into a jar, containing three cubic inches of water, which had been deprived of its air by distillation through mercury: he was very quiet for four minutes and a half, but then began to move about, and, in seven minutes, had fallen on his back, but still continued to move his gills. In eleven minutes, he was motionless, and when taken out, after thirteen minutes, he did not recover. (Recherches, p. 367.) Amphibious animals, likewise, cannot live without air, but its deprivation is not immediately fatal to them. Frogs and toads bear the pump for two or three hours, and a frog recovered on exposure to the air, after remaining in vacuo seemingly dead for eleven hours. Hence we see, that to all these animals, whether inhabiting the air or the water, a constant renewal of fresh air is required, while the actions of life continue. What then are the changes produced on atmospheric air, by these several classes of animal beings, whereby it is rendered so essential to the maintenance of vital action?

For the first and most accurate knowledge we possess concerning the changes which the air suffers by the respiration of insects, we are indebted to the labours of Scheele, who placed bees and flies in phials with air, and found the oxygen removed, and carbonic acid gas substituted in its place. (On Air and Fire, p. 148—155.) M. Vauquelin examined the subject more accurately. The experiments of this excellent chemist were made on the grasshopper (*gryllus viridiflumis*), which is described as having 24 stigmata, or breathing pores, ranged parallel with, but exterior to, two white lines, extending longitudinally on the middle of the belly. In this insect they are of an oval form, but they vary in shape in different insects; and it is chiefly by their mediation, that the changes on the air are effected. A female grasshopper was placed in eight cubic inches of atmospheric air: it breathed from 50 to 55 times in a minute, and lived 36 hours. The air had not sensibly diminished in volume, but, when examined by the test of lime-water, carbonic acid was detected; and after this was removed, the remaining air still extinguished a taper. When many grasshoppers were put at the same time into a given bulk of air, and left till they died, the oxygen gas was nearly, but not entirely, consumed; and phosphorus melted in the residual air, when heat was applied, but burned very little. A male grasshopper lived 18 hours in six cubic inches of oxygen gas: its respiration was oppressive, and it breathed from 60 to 65 times in a minute. The volume of air was not sensibly diminished, but it lost $\frac{1}{10}$ ths of its bulk by being

washed in an alkaline solution. (Ann. de Chimie, tom. xii.) From these facts we learn, that insects, by their respiration, consume the oxygenous portion of the air; that carbonic acid is, at the same time, produced; and that, when all the oxygen gas has disappeared, the animal no longer survives.

M. Huber found, that bees very speedily die, when put into nitrogen gas; but that they survive in a close vessel of atmospheric air, until almost the last atom of its oxygen gas is consumed. (Mem. sur la Germination, &c.) We likewise confined, says Mr. Ellis, a number of flies in a flask, containing nine cubic inches of air, and then inverted it into a tall glass of mercury. By the third day, the flies were all dead, and the mercury had risen considerably into the neck of the flask. The residual air lost about $\frac{1}{10}$ ths by agitation with lime-water, and the remainder did not suffer the smallest diminution by being placed in contact for two days with phosphorus. These results, therefore, agree with those obtained by Vauquelin, and prove farther, that, by the respiration of flies, the whole of the oxygen gas of the air disappears, and that a bulk of carbonic acid nearly equal thereto is formed. The small diminution of bulk, also, which the air suffered, is to be regarded as a necessary consequence attending the conversion of oxygen gas into carbonic acid, and which, as it accounts for the whole loss the air experienced, seems to authorize the conclusion, that while the oxygen gas had, in this case, completely disappeared, the nitrogenous portion of the air continued undiminished, and probably unaltered.

The researches of Spallanzani and Reaumur further shewed, that the ova of insects cannot be evolved without air; that the larvæ cannot exist without it, nor undergo their change to the pupa state; and that it is equally essential to the transformation of the latter into the perfect insect. Rappports de l'Air avec les êtres Organisés, tom. i. Memoires pour servir à l'Hist. des Insectes, tom. ii.

M. Vauquelin proceeded next to investigate the changes produced on the air by the respiration of the vermes class of animals. He confined a red slug in twelve cubic inches of atmospheric air, and it lived 48 hours. The air was not sensibly diminished in volume, but it extinguished candles, and copiously precipitated lime from water. Phosphorus was melted in this air, but did not suffer any combustion or change of colour. A snail (*helix pomatia*) was next put into twelve cubic inches of atmospheric air, and lived four days. The oxygen gas entirely disappeared; for the residual nitrogen gas contained not an atom of vital air, and, consequently, phosphorus did not burn in it at all: it contained, however, carbonic acid. Slugs and snails, therefore, require fresh air while in an active state, the oxygen gas of which, by the function of their respiratory organs, is made completely to disappear, and a quantity of carbonic acid is produced, while the nitrogenous portion of the air remains unaltered: and when these changes are effected, living action speedily comes to an end. So exactly do these animals separate the oxygenous from the nitrogenous portion of the atmosphere, that M. Vauquelin suggests the employment of them for eudiometrical purposes. Ann. de Chimie, loc. cit.

The numerous experiments of Spallanzani on worms, snails, slugs, &c. confirm the statements of Vauquelin in all essential points. (Memoirs on Respiration. Rappports de l'Air.) He also made experiments on muscles, and several marine testacea: they consumed the air of water in which they were confined, and the water then attracted more, so as to consume all the oxygen when a small quantity of air was confined in contact with it.

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We are indebted to Messrs. Humboldt and Provençal for some experiments on the respiration of fishes, which possess great accuracy. Their attention was first directed to ascertain the quantity and composition of the air that exists naturally in river-water. For this purpose, they filled glass balloons with given quantities of water, taken from the river Seine, and expelled the air from it by submitting it to ebullition. The air that came over was received in vessels filled with mercury, or with distilled water recently boiled, that no foreign air might mix with that obtained from the water in the balloon. From the results of ten experiments, conducted in this manner, they found, that the water of the Seine contained rather less than $\frac{1}{3}$ th of its volume of air. This air they farther found to be composed of about $\frac{1}{3}$ th this oxygen, with from 6 to 11 per cent. carbonic acid, and the remainder was nitrogen gas. Mem. d'Arcueil, tom. ii.

Having thus determined the quantity and kind of air contained in a given volume of river-water, these chemists proceeded to ascertain the changes which it experienced by the respiration of fishes. With this view, they confined young fishes in bell-glasses of river-water, inverted over mercury; and suffered them to remain till their respiration became laborious. The animals were then withdrawn, and the water, in which they had respired, was transferred into the balloon, and its air expelled, by submitting it to ebullition, in the manner before stated. Seven tenches were, in this manner, confined in 4000 cubic centimeters, equal to 250.5 cubic inches of river-water, where they remained eight hours and a half. A portion of this water, equal to 2582 cubic centimeters, or 161.5 cubic inches, was then transferred from the glass-bell into the balloon, and its air expelled by heat. The air, thus obtained, measured 453 parts, at temperature 50° Fahrenheit. These 453 parts were then washed in lime-water, by which they were reduced to 300, so that 153 parts of carbonic acid were thus removed. The residue was afterwards analysed by combustion with hydrogen, and by mixture with nitrous gas; and the means of three analyses afforded 0.035 of oxygen; wherefore it is concluded, that the 453 parts of air, obtained from water which had been in contact with the respiratory organs of fishes, consisted of 10.5 oxygen, 289.5 nitrogen, and 153.0 carbonic acid gas. But by former experiments, it was found, that an equal volume of pure river-water afforded 524 parts of air, consisting of 155.9 oxygen, 347.1 nitrogen, and 21.0 carbonic acid; consequently, say these chemists, these seven tenches have absorbed, in eight hours, 145.4 of oxygen, and 57.6 of nitrogen gas; and they have produced in the same time 132 parts of carbonic acid. (Mem. d'Arcueil, t. ii. p. 376.) Mr. Ellis has pointed out some sources of fallacy, from which these apparent results may have arisen, and it is probable from analysis, that in fishes, as in other animals, the change produced by respiration is the conversion of oxygen into an equivalent portion of carbonic acid.

The changes which the air undergoes from the respiration of REPTILES are detailed in that article. Its alterations in the breathing of mammalia and birds are the same as in man.

"The preceding facts," says Mr. Ellis, "sufficiently shew, that various animals, in all the foregoing classes, and in every stage and form of their existence, require the presence of oxygen gas to maintain the functions of life; that this gas, by the exercise of these functions, is converted into carbonic acid: and that the degree in which this conversion proceeds, depends much on the healthy condition of the animal, and the vigour of its circulating system. Since, also, in every instance where the experiments have been

made with the requisite accuracy, the bulk of carbonic acid produced, nearly or exactly equalled that of the oxygen which disappeared, we may conclude, from analogy, that such is universally the extent to which this change in the air takes place in animal respiration; and since, farther, the nitrogen gas of the air appears to suffer no necessary change in the exercise of this function, we may also conclude, that, as far as regards the air, the substitution of an equal bulk of carbonic acid for the oxygen gas that is lost, comprises the only essential change which the atmosphere experiences during the performance of this animal process. We have before maintained that the oxygen of the air does not enter the animal system, either by the living function of absorption, or by the operation of chemical affinity; and have consequently concluded, that the union of this substance with the animal carbon takes place exterior to the vessels of the living animal." Further Inquiry, p. 271.

Animal Heat.—Taking the specific caloric of water at 1.0000, Dr. Crawford found that of arterial blood to be 1.0300, and that of venous blood 0.8928; that of oxygen gas compared to water, as 4.7490 to 1.0000; of nitrogen, 0.7936; atmospheric air, 1.7900; and of carbonic acid gas, 1.6454. The power of oxygen gas to supply heat, says Mr. Berthollet, is well known, and there is no substance which suffers so much of it to escape in the changes of its constitution.

In the respiration of animals, as well as in the germination of seeds, and the vegetation of plants, the oxygen gas of the atmosphere is converted into carbonic acid. Since the specific caloric of the latter is little more than one-third of that which the oxygen gas itself previously contained, it necessarily follows, that a large quantity of caloric is liberated, whenever this conversion of gases takes place. Now, in the living processes just alluded to, the presence of caloric is very obvious: we refer for proofs on these subjects, to the articles HEAT, *Animal*, MAMMALIA, BIRDS, FISHES, INSECTS, REPTILES, and VERMES, in which the facts connected with their vital temperature are detailed; also to the two "Inquiries" of Mr. Ellis.

Since, then, all animals possess a temperature exceeding that of the medium which they inhabit, and since this, in man and the superior animals, varies but little under every vicissitude of heat and cold, consistent with the due performance of the animal functions, there must exist in all cases appropriate means of sustaining this function. But no living powers of the animal system are sufficient for this purpose, independent of the concurring aid of external agents. No supposed attrition between the contiguous soft parts of the animal; no friction between the vessels and globules of the blood; no action of the solid parts upon one another; no circumstances arising out of digestion or fermentation in the living body; no imagined combustion of phosphorus in the blood; no liberation of the phlogistic or any other principle, through the system, can be received as sufficient to account for the uniform height and steadiness of this temperature. As, therefore, the animal system, by virtue of its own powers, is unable, within itself, to produce this high degree of heat, to what external agent shall we have recourse, and to what organs shall we refer the production of that more or less elevated temperature which is observable in all animals.

Insects, worms, and fishes, which have no respiratory structure similar to that of the lungs; and reptiles, the surface of whose lungs, in proportion to that of the body, is comparatively small, and whose blood, at each circulation, is but partially exposed to the influence of the air, possess a

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degree of heat but little above that of the medium in which they live; while the mammalia have a temperature considerably higher; and birds, whose lungs bear the largest proportion to their bodies, are the warmest of all animals. The observation of these facts led naturally to the opinion, that the temperature of animals was immediately connected with the functions of the respiratory organs; and an abundance of facts, collected and arranged by Mr. Ellis, prove that the small excess of temperature, which not only the inferior animals, but which vegetables also possess, is actually derived from the decomposition of the air by these several classes of beings, so long as living action continues. "No explanation, however," says Mr. Ellis, "of the mode in which the air contributes to sustain animal heat, was attempted, till after the great discovery of latent heat by Dr. Black. That excellent philosopher having already proved that the change effected, in the air by respiration, consisted in the formation of carbonic acid, similar to what happens in many examples of combustion, ascribed the production of animal heat to the decomposition of the air in the lungs, by which its latent heat was rendered sensible, in the same manner as it is given out in combustion. The blood, in its passage through the lungs, had, he conceived, its temperature by this means raised; and thus was rendered capable of communicating heat to all parts of the body, in the course of its circulation through the system. To this it was objected by Dr. Cullen, that, if true, the temperature of the body ought to be greatest in the lungs, and to diminish gradually, as the distance from the lungs increases, which is not according to fact. This difficulty was removed by the ingenuity of Dr. Crawford, who, by a happy extension of Dr. Black's doctrine, maintained, that the heat, liberated by the decomposition of the air in the lungs, passed into the blood, and existed in that fluid in the form of latent, or, what is now termed, specific heat, in consequence of which its temperature was not raised; and that this heat, by other chemical changes, was given out by the blood in a sensible form during its circulation.

"In what manner, then, does the air, breathed by the superior animals, give out its heat, to support that high degree of temperature above the surrounding medium, which they all possess? We have seen reason to conclude, that the inspired air is decomposed in the bronchial cells of the lungs, and that all its oxygenous portion which disappears, is converted into carbonic acid, by carbon emitted from the exhalent surface of those organs. During this gradual conversion of the oxygen gas, a quantity of specific caloric, much greater than what is necessary to maintain the elasticity of the carbonic acid that is formed, is necessarily set free; and to this excess of heat, thus constantly liberated in the lungs, by the decomposition of the air, do we look as the source of that superiority of temperature, above the surrounding medium, which man and other animals, under every vicissitude of climate, are enabled to exhibit and maintain.

"But if a quantity of caloric be thus constantly disengaged in the lungs, it may be expected that the blood, in its transmission through those organs, should acquire a certain portion of it. To ascertain this point, Dr. Crawford, pursuing the discoveries of Drs. Black and Irvine, mixed together certain quantities of water, at the temperature of 53° , with separate portions of arterial and venal blood; and then measuring the heat of the mixture, at different successive periods, till coagulation took place, he found that the water containing arterial blood preserved a superiority of temperature over that mixed with venal blood; and, from

the results of several trials, he concluded, that the specific heat of the arterial blood of a dog, was to that of the venal, as 114 to 100, and that of a sheep as 115 to 100, or as $11\frac{1}{2}$ to 10. (On Animal Heat, p. 279.) These results derive confirmation from the experiments of Mr. Coleman, who, in order to discover the relative specific heat of arterial and venal blood, while yet retained in the system, strangled a cat, and immediately opened its chest, while the blood in the left ventricle was still florid. He then introduced a thermometer, through an opening in the pericardium on each side of the heart, and it stood at 98° : in the left ventricle the temperature was only 97° , and in the right ventricle it was nearly 99° . In fifteen minutes, however, instead of the right ventricle possessing two degrees of heat more than the left, it was found to have four degrees less. Mr. Aitley Cooper repeated this experiment in different ways, and found invariably, that although the venal blood was superior in temperature at first, yet before coagulation was complete, the arterial became from three to six degrees warmer. (On Suspended Respiration, p. 42, et seq.) These facts afford clear and decisive proof, that the specific heat of the arterial blood exceeds that of the venal, and demonstrate, likewise, that this excess is obtained during the passage of that fluid through the lungs.

"Admitting the lungs, then, to be the organs in which, by a decomposition of the air, the blood, as it passes through them, obtains its heat, it is next required to shew the sufficiency of this decomposition, to supply heat enough for the maintenance of that superiority of temperature, which the warmer blooded animals possess." (Inquiry, p. 234—236.) For an account of the mode in which this was explained by Dr. Crawford, see HEAT, *Animal*.

Although this explanation of the production of animal heat appears simple and satisfactory, and has been held adequate to account for the phenomena by such philosophers as Black, Crawford, Lavoisier, and La Place, the evidence on which it rests is not so clear as to have commanded universal assent, or entirely set aside objections. It has, indeed, been generally allowed, that respiration, and the changes it produces in the air and animal fluids, are essential conditions of the evolution of the caloric in animals; but it has been thought, that there are other circumstances, hitherto perhaps not well understood, which influence the phenomena.

In external appearance the blood is the same in all the vessels of the fœtus; is this any proof that its temperature is owing to the conversion of oxygen gas into carbonic acid?

Is the uniformity of temperature in the higher animals, under varying states of respiration and circulation, and the consumption of various quantities of oxygen, whether in the same or different individuals, consistent with the theory? and can local variations of temperature be explained from it?

Some recent investigations of Mr. Brodie are particularly calculated to increase our doubts on the subject. Having pitched or decapitated animals, he kept up artificial respiration, and thus maintained their circulation. The blood continued to be changed in the lungs from venous to arterial, and from arterial to venous, in the general circulation.

The respective colours of the two kinds of blood could not be distinguished from those which they exhibit in living and healthy animals. Yet the temperature of an animal thus heated, sunk faster than that of another simply killed and left to itself. The following table exhibits the results of such a comparative experiment.

Time.	Rabbit with artificial Respiration.		Dead Rabbit.	
	Thermometer in the Rectum.	Thermometer in the Pericardium.	Thermometer in the Rectum.	Thermometer in the Pericardium.
Before the experiment	100½		100½	
30 minutes - -	97		99	
45 - - -	95½		98	
60 - - -	94		96½	
75 - - -	92		95	
90 - - -	91		94	
100 - - -	90½	87½	93	90½

The animal, in whom artificial breathing was kept up, instead of having its heat maintained by the conversion of arterial into venous blood, and *vice versa*, was thus actually cooled by the air conveyed into its chest.

Having thus ascertained, that the ordinary changes are effected in the blood by its circulation and artificial respiration in a decapitated animal, Mr. Brodie proceeded to shew, that the oxygen of the air undergoes its usual conversion into carbonic acid. He found, that a living rabbit formed 50—56 cubic inches of carbonic acid in an hour; a decapitated animal, in whom artificial respiration was kept up, emitted 40—48 cubic inches in the same time. The thermometer in the rectum of the latter had fallen from 97 to 90, while in another rabbit left to itself, but similarly treated in all other respects, it had fallen only to 91. In a rabbit poisoned with woorara, or the essential oil of bitter almonds, not decapitated, and in which artificial breathing was kept up, 51 cubic inches of carbonic acid were emitted in an hour. The thermometer in the rectum had sunk to 91 in 30 minutes; while it stood in another animal treated exactly the same, excepting the artificial breathing, at 92.

These experiments seem fully to warrant Mr. Brodie's conclusion, "that in an animal in which the brain has ceased to exercise its functions, although respiration continues to be performed, and the circulation of the blood is kept up to the natural standard, although the usual changes in the sensible qualities of the blood take place in the two capillary systems, and the same quantity of carbonic acid is formed as under ordinary circumstances; no heat is generated, and (in consequence of the cold air thrown into the lungs) the animal cools more rapidly, than one which is actually dead."

See the Croonian Lecture on some physiological researches, respecting the influence of the brain on the action of the heart, and on the generation of animal heat; Phil. Transf. 1811, p. 36.

And further experiments and observations on the influence of the brain in the generation of animal heat, Phil. Transf. 1812, p. 378.

On the subject of this article, the most valuable works, both for the collection of facts from various sources, for original views and researches, acuteness of investigation, and close reasoning, are those of Mr. Ellis; entitled, "An Inquiry into the Changes induced on atmospheric Air by the Germination of Seeds, the Vegetation of Plants, and the Respiration of Animals," 1807. And, "Further Inquiries, &c." 1811. Dr. Bozstock's "Essay on Respiration," 1804, is a very valuable collection of the facts known on this subject up to that time. The preceding article is derived in greatest part from these works. We may refer also to Thomson's System of Chemistry, book 5. ch. 3. § 2; and Murray's System of Chemistry, book 9.

ch. 2. § 1. To the valuable memoirs of Messrs. Allen and Pepys, "On the Changes produced in atmospheric Air and Oxygen Gas by Respiration," Phil. Transf. 1808; and "On Respiration," *ibid.* 1809. To those of Lavoisier in the Memoires de l'Academie des Sciences, 1777 and 1780; and in the Société Royale de Médecine, 1782—3. Of Lavoisier and Seguin in the Mem. de l'Acad. 1789, 1790. See also Crawford, on Animal Heat; Goodwyn, on the Connection of Life with Respiration; Menzies, on Respiration; Coleman, on Suspended Respiration; Davy's Recherches; Spallanzani's Memoirs on Respiration, and his Rapports de l'Air avec les êtres Organisés, t. 3. 8vo. Geneva. Priestley on Air. Seguin in Annales de Chimie, t. 5. and 21.

RESPIRE, RESPECTUS, in *Law*, &c. a delay, forbearance, or prolongation of time, granted any one for the payment of a debt or the like.

Menage derives the word *respite* from the Latin *respeclus*; as *despite* from *despectus*. Du-Cange will rather have it come from *respirare*, to breathe; respite being, in effect, a breathing-while, granted a debtor, &c.

In the customary of Normandy, respite is a judicial delay or demur, given to procedures.

RESPIRE, *Letters of*, or CREDIT. See LETTERS.

RESPIRE of *Homage*, is a forbearance of the homage due from the vassal, or tenant, holding by homage, or by knight-service, to his lord.

Anciently, those who held by these tenures paid a small sum every fifth year into the exchequer, to be respited doing their homage or service.

By stat. 12 Car. II. this respite of homage is taken away, as a charge arising from knight-service; which is thereby likewise annulled.

RESPIRE of *Execution*. See REPRIEVE.

RESPIRE of *Jury*. See JURY.

RESPIRED on the *Muster-Roll*, To be, in *Military Language*, is to be suspended from pay, &c.; during which period all advantages of promotion, pay, &c. are stopped. The money which is respited upon the muster-roll is accounted for by the muster-master general, and placed to the credit of the public by the paymaster general.

RESPOND, in *Ecclesiastical History*, was a short anthem sung after reading three or four verses of a chapter: after which they proceeded with the chapter. Gibson 263.

RESPONDEAS OUSTER, in *Law*, is to answer over in an action to the merits of the case: or put in a more substantial plea.

RESPONDEAT SUPERIOR, a law phrase. Where the sheriffs are removable, as in London, for insufficiency; *respondeat superior*, that is, the mayor and commonalty are to answer for them.

If a coroner of a county is insufficient, the county as his superior shall answer for him. (Wood's Inst. 83.) If a gaoler

gaoler constitutes another under him, and he permits an escape, if he be not sufficient, *respondet superior*; and superior officers must answer for their deputies in civil actions, if they are insufficient to answer damages.

For the insufficiency of a bailiff of a franchise *respondet superior*, that is, the lord of the franchise is to answer.

RESPONDENT, RESPONDENS, in the schools, a person who maintains a thesis in any art or science.

He is thus called, as being to answer all objections proposed by the opponent, or impugner, &c.

The respondent's business is to see whether the opposition made by the contrary party be just and legitimate; or whether some of the laws and conditions of opposition be not broken; which is called *ignoratio elenchi*. He is also to examine the moods and figures of the syllogisms, to see whether the premises be just, &c. and through the whole to answer rather by distinguish's, than by direct negation.

RESPONDENT, formed from the Latin *respondere*, to answer, q. d. *pro alio spondere*, to promise for another, in Law, a person who undertakes to answer for another; or binds himself as security for the good behaviour of another.

The respondent is to answer for the damages done by the person for whom he responds. There are four ordinances of the kings of France, by which the citizens are expressly forbid to take servants without respondents, bound in writing.

RESPONDENTIA, in Commerce, a term applied to money which is borrowed, not upon the vessel, as in bottomry, but upon the goods and merchandize contained in it, which must necessarily be sold or exchanged, in the course of a voyage; in which case the borrower, personally, is bound to answer the contract; and he is said to take up money at respondentia.

It is enacted, by stat. 19 Geo. II. cap. 37, that all monies lent on bottomry, or respondentia, on vessels bound to or from the East Indies, shall be expressly lent only upon the ship, or upon the merchandize; that the lender shall have the benefit of salvage; and that, if the borrower has not on board effects to the value of the sum borrowed, he shall be responsible to the lender for so much of the principal as hath not been laid out, with legal interest and all other charges, though the ship and merchandize be totally lost.

Although respondentia and bottomry are of themselves a species of insurance, yet the lender has an insurable interest in his securities, and therefore may protect himself from the sea-risk by insuring them. The lender can insure only the amount of the sum lent, and the borrower has an insurable interest in the ship or goods to the amount of the surplus value above the sum lent. If either were to insure more; it would be a gaming insurance, and void by the statute 19 Geo. II. c. 37, for all above the real interest. But the usage of trade may take a case out of this rule. Upon an insurance on goods, specie and effects in the India trade, the insured may recover for money laid out for the use of the ship, and for which he charged respondentia interest, it being the usage of trade to insure in this form. A policy on bottomry or respondentia cannot be subscribed by the borrower of the money, because it is only in consideration of the sea-risk, from which he is exempt, that he agrees to pay the marine interest. If he were to become an insurer, this would be no longer a loan upon bottomry, but a cloak for usury. Respondentia and bottomry securities, though they are the subject of insurance, must be particularly and specifically described in the policy; for under the general denomination of goods, these securities cannot be insured. By 19 Geo. II. c. 32. if an under-writer become bankrupt before a loss happen, the insured may claim; and after a

loss, prove his debt under the commission, and receive his dividend, as if the loss had happened before the bankruptcy. See BOTTOMRY.

RESPONSA PRUDENTUM. See CIVIL and RESPONSE.

RESPONSALIS, in Law, he who appears for another in court at a day assigned.

Fleta makes this difference between *responsalis attornatus*, and *effeniator*, that the *effeniator* came only to allege the cause of the party's absence, be he demandant or tenant; whereas *responsalis* came for the tenant not only to excuse his absence, but to signify what trial he means to undergo, the combat, or the country.

RESPONSARY SONG, an anthem in which the choristers sing by turns.

RESPONSE, RESPONSAL, *Responfatio*, an answer, reply, or repartee.

The word is chiefly used in speaking of the answers made to the priest, by the people, in the litany, the psalms, and other parts of the office.

It has its use, too, in speaking of the opinions or answers of the ancient juriconsulti, when consulted on points of law.

The fifty books of the Digest are composed of *responsa prudentum*, the responses of Papinian, Ulpian, Scaevola, &c. collected by Justinian; who afterwards gave them the force of laws. See CIVIL Law.

The responses of the emperors were more properly called *rescripts*; which see.

RESPONSIONS, RESPONSIONES, a term used in the *Military Orders*, for certain pensions or charges, which the knights, or the commandries they held, paid to the order.

Such a knight templar paid a responfion of fifty pounds *per annum* to his order, on account of such a commandry.

In Rot. Parl. 9 Ric. II. the word is written *responcies*.

RESPONSORIA, responses sung in chorus by the choir, in answer to the priest in the cathedral service.

RESSAVA, in Geography, a town of European Turkey, in Servia; 46 miles S.E. of Belgrade.

RESSAULT, in Architecture, the effect of a body which either projects, or falls back, *i. e.* stands either more out or in than another; so as to be out of the line, or range, with it.

The term *ressault* is French, and but little used in English; though the want of a word of equal import pleads for its naturalization.

RESSEL, or ROESSEL, in Geography, a town of Prussia, in the province of Ermeland, with a castle; 50 miles S. of Königsberg.

RESSELA, a term used by Paracelsus to signify, as himself explains it, any thing that expels heat, in opposition to *assa*, which with him signifies any thing that promotes it.

RESSONS, in Geography, a town of France, in the department of the Oise, and chief place of a canton, in the district of Compiègne; 10 miles W.S.W. of Noyons. The place contains 1039, and the canton 9637 inhabitants, on a territory of 170 kilometres, in 23 communes.

RESSORT, or RESORT, a term purely French, yet frequently used, by our late writers, to signify the jurisdiction or authority of a court.

The word, in its popular meaning, signifies *spring*, or the force of elasticity. Hence it is also used for a jurisdiction, and the extent or district thereof; as when we say, such a thing belongs to his ressort; a judge out of his ressort has no authority. But its chief use among us is in speaking of a court or tribunal, where appeals are judged; or of a court or person who judges finally and ultimately, and whence there is no appeal.

The house of lords judge in the last resort, *en dernier ressort*. Prefidials judge in the last resort of all criminals prosecuted by the provosts of the marshals. See *DERNIER ressort*.

RESSORT, or *Resort*, is also used in a writ of ayel, or coufenge, in the same sense as *descent*, in a writ of right.

RESSOURCE, or RESOURCE, a term purely French, yet used by English writers to denote a means or foundation of a man's recovering himself from his fall or ruin; or an after-game for the repairing of his damages.

Skinner derives the word from the French *refoudre*, to *refolve*. A resource strictly and literally expresses a means which presents itself afresh.

This merchant has credit and friends still left; he has great resources.

REST, QUIES, in *Physics*, the continuance of a body in the same place; or its continual application or contiguity to the same parts of the ambient and contiguous bodies. See *SPACE*.

Rest is either *absolute* or *relative*, as place is. See *PLACE*. Some define rest the state of a thing without motion; and hence again rest becomes either absolute or relative, as motion is. See *MOTION*.

Sir Isaac Newton defines true or *absolute* rest to be the continuance of a body in the same part of absolute and immoveable space; and *relative* rest to be the continuance of a body in the same part of relative space.

Thus, in a ship under sail, relative rest is the continuance of a body in the same region of the ship, or the same part of its cavity. True or absolute rest is its continuance in the same part of universal space, in which the ship, with its cavity and contents, are all contained.

Hence, if the earth be really and absolutely at rest, the body relatively at rest in the ship will really and absolutely move, and that with the velocity with which the vessel moves. But if the earth do likewise move, there will then arise a real and absolute motion of the body at rest; partly from the real motion of the earth in absolute space, and partly from the relative motion of the ship on the sea. Lastly, if the body be likewise relatively moved in the ship, its real motion will arise partly from the real motion of the earth in immoveable space, and partly from the relative motion of the ship on the sea, and of the body in the ship.

Thus, if that part of the earth, where the ship is, move eastward with a velocity of 10,010 parts, and the vessel be carried by the wind westward ten parts, and, at the same time, a seaman aboard walk with the velocity of one part, the seaman will be moved really and absolutely in immoveable space eastward, with 10,001 parts of velocity; and relatively on the earth, with nine parts of velocity westwards.

It is an axiom in philosophy, that matter is indifferent as to rest or motion. Hence sir Isaac Newton lays it down as a law of Nature, that every body perseveres in its state, either of rest or uniform motion, except so far as it is disturbed by external causes.

The Cartesians will have firmness, hardness, or solidity of bodies to consist in this, that their parts are at rest with regard to each other; and this rest they establish as the great nexus, or principle of cohesion, by which the parts are connected together.

Fluidity, they add, consists in a perpetual motion of the parts, &c. But the Newtonian philosophy furnishes us with much better solutions. See *SOLIDITY*, *FLUIDITY*, and *COHESION*.

Monsieur de Maupertuis asserts, that when bodies are in equilibrio, they must be so situated, that, if any small motion be impressed on them, the quantity of action resulting

will be the least possible. This he calls the law of rest, and from this law he deduces the fundamental proposition of statics. See *Mem. de l'Acad. de Berlin*, tom. ii. p. 294.

Monsieur de Maupertuis deduces the laws of percussion from the same principle. See *Quantity of ACTION*.

REST, *Repose*, or *Pause*, in *Poetry*, is used for the *cæsura*, which, in Alexandrine verses, falls on the sixth syllable; and, in verses of ten or eleven syllables, on the fourth.

The rest should never fall on a monosyllable, on which the voice may not dwell: it is called rest, because the ear and the pronunciation have both a repose, or respite.

REST, in *Military Language*, a kind of fork to support muskets, when presented in order to fire. Sometimes these rests were armed with a contrivance called a swine's feather, which was a sort of sword-blade, or tuck, that issued from the staff of the rest, at the head: this, being placed before the musqueteers when loading, served, like the stakes placed before the archers, to keep off the cavalry. See *MUSKET*.

Rests were of different lengths, according to the heights of the men who were to use them; they were shod with sharp iron ferrils, for sticking them into the ground, and were, on the march, when the musket was shouldered, carried in the right hand, or hung upon it, by means of a string or loop tied under the head.

REST *Arms, To*, is to bring the firelock to the same position as in present arms.

To REST upon reversed Arms. At military funerals the arms are reversed: on which occasions, the soldiers belonging to the firing party, rest upon the butt ends of their firelocks, while the funeral service is performed, leaning with their cheeks so as to turn from the corpse; and the word of command is "Rest upon your arms reversed."

REST, in *Tilting Armour*. See *TILTING Armour*.

REST, in *Music*, is a pause, or interval of time, during which there is an intermission of the voice, or sound.

Rests are sometimes used in melody, that is, in music of a single part, to express some simple passion, or even for variety sake; but more frequently in harmony, or compositions of several parts, for the sake of the pleasure of hearing one part move on while another rests, and this interchangeably.

Rests are either for a whole bar, or more than a bar, or but for a part of a bar. When the rest is for a part, it is expressed by certain signs, corresponding to the quantity of certain notes of time; as minim, crotchet, &c.; and is accordingly called *minim-rest*, *crotchet-rest*, &c.

The characters or figures of which, see under *CHARACTERS of Music*, where the notes and corresponding rests are found together.

When any one of those characters occurs, either on a line or space, that part is always silent for the time of a minim, or crotchet, &c. Sometimes a rest is for a crotchet and quaver together, or for other quantities of time for which there is no particular note; in which case the signs of silence are not rests, but such silence is expressed by placing together as many rests, of different time, as make up the designed rest. When the rest is for a whole bar, the semi-breve rest is always used. If the rest be for two measures, it is marked by a line drawn across a whole space. For three measures it is drawn across a space and a half, and, for four measures, across two spaces. But, to prevent ambiguity, the number of bars is usually written over the sign.

Some of the more ancient writers in music make these rests of different value in different species of time, *e. gr.* the character of a minim-rest, in common time, say they, expresses the rest of three crotchets in triple time; in that of the

the triples $\frac{6}{8}$, $\frac{6}{8}$, $\frac{1}{8}$, $\frac{1}{8}$, it always marks a half-measure, how different soever these may be among themselves.

They add, that the rest of a crotchet in common time is a rest of three quavers in the triple $\frac{3}{8}$, and that the quaver-rest of common time is equal to three femiquavers in the triple $\frac{3}{8}$. But this variety in the use of the same character is now laid aside. Malcolm's Treat. of Music, p. 409, &c.

Franco, the inventor of musical characters for time, commonly ascribed to John de Muris, in the fourth chapter of his tract in the Bodleian library, entitled "Ars Cantus Mensurabilis," says, "as the sounds in each mood are expressed by different notes or figures, and as discant itself is as much regulated by *silence* as by sound, it will be necessary to treat not only of the signs or representatives of sounds, but of their equivalent rests or pauses."

But though Magister Franco may have invented the first time-table, consisting of full or black notes; John de Muris seems to have arranged the second time-table, consisting of void or open notes, from the maxima to the minim. And in Morley's time, the notes were multiplied and accelerated to the femiquaver, with their equivalent rests. See the *third TIME-TABLE*.

REST-Harrow, in *Botany*. See ONONIS.

RESTAUR, RESTOR, in *Ancient Customs*, the remedy or recourse which assurers have against each other, according to the date of their assurances; or against the masters, if the average arise through their default; as through ill loading, want of caulking, or want of having the vessel tight.

The word is also used for the remedy, or recourse, a person has against his guarantee, or other person, who is to indemnify him from any damage sustained. Hence *restaurant* and *restauration*. In the lower Latin they also use the words *restor* and *restaur*.

RESTAURATION, RESTAURATIO, *Restoration*, the act of re-establishing, or setting a thing in its former good estate.

Thus we say, the restauration of a minor to the possession of his effects, alienated in the time of his minority. In the French laws it is an ancient formula, used for the restoring a person to his good name, after he has been wrongfully accused and condemned.

In England we say *the Restauration* or *Restoration*, by way of eminence, for the return of king Charles II. in 1660, after the civil wars.

The 29th of May is an anniversary festival, appointed to be held in commemoration of the restoration of regal and episcopal government, by stat. 12 Car. II. c. 14.

We shall here observe, that the form of prayer for the 29th of May, as well as for the 30th of January, were of a different complexion in the reign of king Charles II. from the present, of which the reason is said to be this: the parliament and other leading men, who were active in his restoration, and who had been concerned in opposing his father's measures, would not be called traitors; and required that a distinction should be made between the commencement of the war and the conclusion of it; they would not suffer the first opposition made to the measures of that unhappy prince to be styled rebellion, though they disapproved of the abolition of regal government which ensued.

And accordingly the offices for these two solemnities were drawn up, without any reflection on the first authors or promoters of the opposition, and, in general, breathe more a spirit of piety than of party, of humiliation than of revenge; and, throughout, are modest, grave, decent, sensible, and devout. King James II. altered these forms, and king William did not venture to reduce them to their primi-

tive state; and so they have continued, with very little variation, to this day.

There is no order in either of these offices for a sermon or homily on this day; and in the office of Charles II., there is no direction for a sermon or homily on the 30th of January; but by the office of James II. it is required that on the said 30th day of January shall be read the first and second parts of the homily against disobedience and wilful rebellion, or else the minister shall preach a sermon of his own composing upon the same argument. The 29th of May is not a holiday in any of the law-offices, and consequently no officer can take an extraordinary fee for business done on that day. 7 Term Rep. 163.

By 12 Car. II. c. 14. it is enacted, to the end that all persons may be reminded of their duty on the 29th of May, and be the better prepared to discharge the same with that piety and devotion which become them, that every minister shall give notice to his parishioners publicly in the church at morning prayer, the Lord's day next before such 29th day of May, for the due observation of the said day, and shall then likewise publicly and distinctly read this present act to the people.

RESTAURATION, in *Architecture*, the act of repairing all the parts of a building gone to decay, either through the course of time, or other injuries; in such manner, as that it is not only re-established in its first form, but considerably augmented.

It is evident, from the plinths of the Corinthian columns of the Pantheon (which are almost wholly under ground), that the pavement of this temple is only a restauration made in the time of Septimius Severus. Daviler.

The temple of Concord, behind the Capitol at Rome, having been burnt long after it was built, and having angular bases different from the rest, seems to have been restored from the ruins of several ancient buildings.

RESTAURATION, in *Sculpture*, is the repairing of a mutilated statue, &c. See REPAIRING.

Most of the antique statues have undergone a restauration; as the Farnese Hercules, the Faunus in the Villa Borgheze at Rome, the Wrestlers in the gallery of the great duke of Florence, the Venus of Arles, in the gallery at Versailles. But these restaurations have all been made by the ablest sculptors. Daviler.

RESTIACEÆ, in *Botany*, a natural order of plants, first separated from the *Junci* of Jussieu by Mr. Brown, Prodr. Nov. Holl. v. 1. 243, and named from one of its chief genera; see RESTIO. The characters are these.

Perianth unconnected, deeply divided into from two to six segments, or rather of so many leaves; rarely wanting. *Corolla* none. *Stemens* definite, from one to six; when they are two or three, in a four or six-cleft perianth, they are opposite to its inner leaves. *Germen* of one or several cells, each cell containing one pendulous seed, except in *Xyris*, whose seeds are numerous. *Pericarp* either capsular, or amentaceous. *Seeds* inverted. *Albumen* shaped like the seed. *Embryo* lenticular, situated in the lower end of the seed, opposite to its scar, at the outside of the albumen.

Plants herbaceous or somewhat shrubby, almost all exotic with respect to Britain, and even Europe. *Leaves* simple, narrow, in some cases wanting. *Stems* naked, but often furnished with sheathing scales, cloven at one side, imbricated, or equitant, at the other. *Flowers* for the most part aggregate, spiked or capitate, separated by *bractæas*, the *stamens* and *styles* generally in separate individuals.

This order is distinguished from the *Junci*, by having the embryo external, and contrary to the scar; from the *Commelineæ* of Brown, by the figure of that part, and its not being

being enveloped in the albumen. Those genera which have the habit of the *Cyperaceus* order, are well distinguished from it by the sheaths of the stem being split, not undivided. *Xyris*, though referred to the *Restiaceæ*, and scarcely more akin to any other tribe, still differs widely from the rest of this order; especially in the petal-like inner segments, or leaves, of its perianth; the claws bearing the stamens at their summits; and the numerous seeds. See Observations on the generic character of RESTIO.

The New Holland genera of the present order are *Restio*, *Lepyrodia*, *Lyginia*, *Anarthria*, *Loxocarya*, *Leptocarpus*, *Chatanibus*, *Hypoleuca*, *Aphelia*, *Devauxia*, *Alepyrum*, *Eriocaulon* and *Xyris*.

RESTIARIA, a name given by Rumphius, in his *Herbarium Amboinense*, v. 3. 187, to two or three different shrubs, on account of their fitness for ropes, or cordage; *restarius* being a sort of base Latin word for a rope-maker. The first of these, *R. alba*, t. 119, is a very well-marked genus, for which the name might have been retained; but Linnæus, in his *Supplementum*, has called that genus *Commerstonia*, after the example of Forster, in his *Nova Genera* t. 22. (See *COMMERSTONIA*.) Of the second, termed *R. nigra*, Rumphius gives no plate. We shall speak of it presently. The third he has called *Perticaria*, from *pertica*, a staff or pole; which name is also a synonym of the other two. Nothing is known respecting the flowers, or generic character, of this last. Loureiro has adopted the name *Restiaria*, for a plant which he supposes the same with the *nigra* of Rumphius, but of which he knew the female flowers only. The following is his account of it. Loureir. Cochinch. 639. Class, *Dissecta*; Order unknown, as well as the Nat. Ord.

Gen. Ch. Male flowers unknown.

Female on a separate plant. *Cal.* Perianth superior, oblong, capsular; limb in five deep, lanceolate, spreading segments. *Cor.* none. *Pist.* Germen inferior, oblong; style none; stigma concave. *Peric.* Capsule calycine, ovate-oblong, somewhat tapering at each end, five-ribbed, hairy, with two cells and two valves. *Seeds* numerous, compressed, roundish, with a long, thin, membranous, linear wing at each side.

Ess. Ch. Male

Female, Calyx five-cleft, capsular, superior. Corolla none. Stigma concave. Capsule with five ribs, two cells, two valves, and numerous winged seeds.

Obs. We do not profess to understand Loureiro's expressions of *perianthium capsulare*, and *capsula calycina*, but give them as we find them, having no knowledge of the plant itself. De Theis suggests its affinity to *Gouania*.

1. *R. cordata*. Lour. (*R. nigra*; Rumph. Amb. v. 3. 188?)—Native of the woods of Cochinchina. A large shrub, with a reclining stem, and climbing branches, destitute of tendrils or thorns. Leaves opposite, heart-shaped, rugose, hairy, entire, large. Flowers in lax, axillary panicles, with long general as well as partial stalks. The bark is tough and porous, splitting into long strips, of which torches are made, and which serve also for caulking of vessels. The generic name was adopted by Loureiro, because of the fitness of the stems and branches for cordage.

RESTINCLIERS, in *Geography*, a town of France, in the department of the Herault; nine miles N.E. of Montpellier.

RESTINCTION, RESTINCTIO, in *Chemistry*, the quenching of a metal or mineral in some liquor, in order either to correct or to exalt it; by giving it some new quality, power, &c.

RESTING GROUND, in *Gardening*, the means of re-

freshing it, and of restoring its fertility by the omission of culinary crops, and the cultivation of such as have this tendency, or by any other methods which may have the same effect. It is a sort of management which is principally accomplished in two different ways: the former of which is that of sowing a certain portion of it, annually, with corn and some sort of grass seeds, suffering it to continue under the latter of them for three or more years, as in arable field lands, in order that it may then be broken up again. This is a very beneficial method, but not much practised, except by market-gardeners, who employ these two crops in feeding and foddering their cattle. When made use of in other ways, as in other gardens, great care should be taken that the grass never runs up to seed, as is sometimes the case in market-gardens, but in all other particulars the practice may be entirely the same. In this way of proceeding, by sowing and laying down a certain quantity of ground every year, the same extent may be broken up, which will, of course, afford so much fresh soil annually, upon which such garden crops as answer best on newly broken up land, may be put in and raised, as those of onions, carrots, turnips, and a great many other kinds.

The latter of the above modes of managing the business, is, however, better adapted to gardens in general, as being more suited to the nature of their culture. It was, probably, first suggested by the author of the "Scotch Forcing Gardener;" and is extremely well suited to produce the same effects and advantages as that which has been already noticed; and it may, indeed, in some cases, be combined with it, or used conjointly, with great benefit; as by such means much fresh surface soil will be yearly at the command of the gardener. The manner of performing it is this; after taking three culinary crops off from the first surface, the ground is to be trenched over three spits deep, by which the bottom and top parts are reversed, and the middle part still remains in that situation; then three similar crops are to be taken off from this surface, and the ground afterwards trenched two spits deep, by which means the top becomes the middle, and the middle the top; three of the same kind of crops being here also taken off from this surface, and then the ground trenched three spits again, that part which was last the middle, and now the top, becomes the bottom; and that which is now the bottom, and was the surface at first, now becomes the surface again, after having had six years' rest. By this alternate manner of proceeding, one time trenching three spits deep, and the other two, the surface will constantly be changed, and will rest six years, while it is three years productive. On which account there will be continually new ground and soil in the garden for the growth of healthy culinary vegetables; and besides, much less manure will be wanted than where the soil is shallow, and the same surface constantly under culinary crops.

Proper and careful modes of cropping, as well as other kinds of management, may likewise, in many cases, contribute greatly to the same intention.

RESTING Land, in *Agriculture*, the means of keeping it without any sort of crop, or only under particular kinds, in the view of restoring its fertility. This is done in the practice of naked fallowing, as well as that of cultivating green crops by way of a fallow, and by laying land down to the state of grass, in order to its being afterwards broken up for grain crops. See *FALLOW* and *FALLOWING*, also *GREEN CROPS*, and *LAYING DOWN TO GRASS*.

RESTIO, in *Botany*, from *restis*, a cord, because many of the genus serve, at the Cape of Good Hope, where they abound, to make ropes, baskets, &c. *Restio* is properly a person who sells cord, or ropes. *ELEGIA*, see that article,

is nearly related in habit, as well as characters, to the present genus, and was finally united to it by Linnæus, contrary to Thunberg's opinion.—Linn. Syll. Nat. ed. 12. v. 2. 735. Schreb. 676. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 368. Brown Prodr. Nov. Holl. v. 1. 244. Thunb. Diss. May 17. 1788. Rottb. Gram. 1. Jull. 44. Labill. Nov. Holl. v. 2. 77. Lamarck Illustr. t. 804. (Chondropetalum; Rottb. Gram. 10. Calorophus; Labill. Nov. Holl. v. 2. 78.)—Class and order, *Dioecia Triandria*. Nat. Ord. *Calamaria*, Linn. *Junci*, Jull. *Rejliaceæ*, Brown.

Gen. Ch. Male, *Cal.* Catkin ovate or oblong, many-flowered; its scales coriaceous, imbricated, keeled. Perianth compressed, of four or six, nearly equal leaves; two of the outer ones boat-like, the third flat; the three innermost lanceolate, thinner, one of them broader than the rest. *Cor.* none, except the three inner leaves of the calyx be so considered. *Stam.* Filaments three, sometimes but two; anthers oblong, simple, peltate.

Female, on a separate plant, *Cal.* and *Cor.* as in the male. *Pijl.* Germen superior, triangular; style one, deeply divided into two or three parts; stigmas feathery. *Peric.* Capsule with two or three lobes, and as many cells, bursting at the prominent angles. *Seeds* solitary, somewhat oval.

Obf. *Chondropetalum* of Rottboll differs from the rest of the species, in having the inner segments of the calyx longer, and of a cartilaginous texture. This difference, and the still more remarkable one in *Xyris*, between the outer and inner segments of the calyx, might surely authorize us to call the three latter a corolla, in both these instances.

Eff. Ch. Male, Catkin imbricated. Perianth of four or six leaves, shorter than the scales of the catkin, destitute of internal scales. Corolla none. Anthers peltate.

Female, Catkin and Perianth like the male. Stigmas two or three. Capsule of two or three lobes, and as many cells, bursting at the angles. Seeds solitary.

The plants of this genus have a hard, rigid, smooth, rusty habit. The root is scaly, creeping, and perennial. *Stems* rusty, simple or branched, leafless, sheathed with scales split at one side. *Catkins* either solitary, spiked or panicled. Mr. Brown observes, that the scar of the *seed* is naked in the New Holland species, but in those from the Cape of Good Hope it is bordered. Several things which Thunberg and Rottboll have referred to *Resfia*, are by Mr. Brown removed to other genera; see LEPTOCARPUS and THAMNOCHORTUS. This author defines 24 New Holland species, in his Prodrômus. How many are found at the Cape, we have no means of determining, because of the uncertainties respecting their generic characters, which we have not materials to remove. The following may serve as examples.

Section 1. *Stem simple.*

R. tetrorum. Thatch Rope-grafs. Linn. Suppl. 425. Ait. n. 1. (Chondropetalum deustum; Rottb. Gram. 10. t. 3. f. 2.)—Stem simple. Leaves none. Catkins racemose, mostly leaning one way, drooping, bracteated, roundish, triangular. Gathered by Thunberg at the Cape, from whence Mr. Mallon sent living plants to Kew, in 1793. They are kept in the greenhouse, blossoming in May and June. The root is perennial, small and tapering, throwing out horizontal scaly shoots. *Stems* several, a foot and half high, erect, very straight, round, slender, smooth, unbranched, with short taper-pointed sheaths at the joints. *Cluster* terminal, compound, about two inches long, variegated with black, or dark purple, and brown. The stems are used for thatching, for which their hard rigid nature is well calculated; nor is this thatch disturbed by the very high winds that prevail in southern Africa. Thunberg.

R. serenus. Pendulous-headed Rope-grafs. Linn. Suppl.

425. Thunb. Reit. n. 4. t. 1. f. 2.—Stem simple. Leaves none. Catkins turbinate, pendulous, on capillary stalks. Native of the Cape, on hills about the Table mountain. The stem is slender, jointed and smooth, two feet high, or more, with scales at the joints, but no leaves. *Catkins* three, four, or five, at the top of each stem, about the size of a pea, brown, obtuse, tapering at the base, pendulous, each supported by a capillary stalk. *Scales* obtuse, with a small point.

R. dichotomus. Fork-leaved Rope-grafs. Linn. Syll. Nat. ed. 12. v. 2. 735. Rottb. Gram. 2. t. 1. f. 1. (Schænus capensis; Linn. Sp. Pl. 64?)—Stems simple. Leaves repeatedly compound, with awl-shaped leaflets. Panicle drooping. Catkins oblong. Scales taper-pointed. Common at the Cape. *Stems* several, a foot or more in height, bearing a few sheaths. *Leaves*, or, as some call them, barren stems, much shorter than the flowering stems, slender, twisted, branched, with a sheath at each joint; their ultimate subdivisions awl-shaped, channelled. *Panicles* at the top of each stem, of 10 or 12 drooping oblong *catkins*, whose scales are of a shining brown, and very finely pointed.

Section 2. *Stem branched.*

R. verticillaris. Horse-tail Rope-grafs. Linn. Suppl. 425. Thunb. Reit. n. 22. t. 1. f. 7.—Branches whorled, jointed; with ovate scales. Panicle compound, clove.—Found about the banks of rivers at the Cape. *Stem* five or six feet high, resembling an *Equisetum* in its copious, slender, whorled branches, from every joint; bearing numerous ovate, taper-pointed, small scales. We confess ourselves unable to draw a line between these branches, and what we have termed leaves in the last-described species, except that the latter are mostly, if not entirely, radical, and these grow from every joint of the stem. The *catkins* are extremely small and numerous, in branched, repeatedly compound, dense clusters.

R. tetraphyllus. Four-leaved Rope-grafs. Labill. Nov. Holl. v. 2. 77. t. 226, 227. Brown n. 24.—Stems femicylindrical, with blunt sheaths. Leaflets fetaceous. Panicle terminal, compound. Catkins nearly globose. Scales pointed. Male flowers six-cleft; female four-cleft.—Native of New South Wales and Van Diemen's island. *Stems* numerous, stout, three feet high, with a few leafy branches in the upper part, whose ultimate divisions are bristle-shaped. *Catkins* stalked, ovate in the female plant, nearly globose in the male. The perianth of the female flowers has but four leaves, that of the male six.

RESTITUTION, RESTITUTIO, in *Physics*, the returning of elastic bodies forcibly bent to their natural state, by some called the *motion of restitution*. See ELASTICITY.

Contraction being the proper and natural action of muscular fibres, some authors ascribe dilatation to a motion of restitution; but the expression, as well as the idea, is very faulty.

RESTITUTION, in the moral and legal sense, is the act of restoring a person to his right, or of returning something unjustly taken or detained from him.

Restitution is reducible to commutative justice; and till it be made, the casuists determine the party all the while guilty of theft.

The illegal incumbents of benefices are condemned to a restitution of the fruits of the benefices. In the Romish church, usurers, &c. are obliged to a restitution of their ill-gotten goods; otherwise the priest has no authority to give them absolution.

RESTITUTION in *Blood*. See CORRUPTION of *Blood*, *ATTAINDER*, and *PARDON*.

RESTITUTION of Conjugal Rights. See **CONJUGAL Rights.**

RESTITUTION of Stolen Goods, in Law, is allowed to the prosecutor, on a conviction of larciny, by stat. 21 Hen. VIII. c. 11. For, by the common law, there was no restitution of goods upon an indictment, because it is at the suit of the king only; and therefore the party was forced to bring an appeal of robbery, in order to have his goods again. But it being considered that the party, prosecuting the offender by indictment, deserves as much encouragement as he who prosecutes by appeal, this statute was made, which enacts, that if any person be convicted of larciny by the evidence of the party robbed, he shall have full restitution of his money, goods, and chattels, or the value of them out of the offender's goods, if he has any, by a writ to be granted by the justices. And this writ of restitution shall reach the goods so stolen, notwithstanding the property of them is endeavoured to be altered by sale in market overt; or else, without such writ of restitution, the party may peaceably retake his goods, wherever he happens to find them, unless a new property be fairly acquired therein; or, lastly, if the felon be convicted and pardoned, or be allowed his clergy, the party robbed may bring his action of trover against him for his goods, and recover a satisfaction in damages; but such action lies not before prosecution, for so felonies would be made up and healed. See **RECAPTION.**

RESTITUTION of Temporalities of Bishops. See **TEMPORALITIES,** and **RESTITUTIONE Temporalium.**

RESTITUTION in Integrum, is used for what is otherwise called *restitution*.

Religious obtain restitution against their vows, *i. e.* they are freed from their obligation, when they protest against them within five years of their profession.

In the history of Germany for the seventeenth century, the first day of January, 1624, is called the *term of restitution*; because by the peace of Munster, then concluded, the Lutheran and Calvinist princes were obliged to restitute, or restore what they had taken from the Roman Catholic churches in their territories till that day.

By the peace of Westphalia in 1648, the restitution-act was abrogated, and both the contending parties confirmed in the perpetual and uninterrupted possession of whatever they had occupied in the beginning of the year 1624. And all the articles agreed upon by this peace were confirmed and ratified, in the year 1650, at Nuremberg.

RESTITUTION of Medals, or Restituted Medals, is a phrase used by antiquaries, for such medals as were struck by the emperors, to renew or retrieve the memory of their predecessors.

Hence it is, that in several medals we find the letters **REST.** Claudius was the first who began this practice, by striking afresh several medals of Augustus. Nero did the same; and Titus, after the example of his father, struck restitutions of most of his predecessors. Some, however, have maintained that the restituted medals of Claudius and Nero are modern and spurious, and that the practice began under Titus.

Gallienus struck a general restitution of most of the preceding emperors in two medals, the one bearing an altar, the other an eagle, without the *rest.* F. Joubert chooses rather to call them *conversations* than restitutions, as being done quite anew. These were designed to preserve the remembrance of the consecration of those emperors in honour of whom they were struck; and they have all the same legend on the reverse, *viz.* **CONSECRATIO.**

RESTITUTIONE extracti ab ecclesia, in Law, a writ

anciently granted for the restoring a man to the church, or sanctuary, from which he had been forced away.

RESTITUTIONE Temporalium, a writ which lies where a man is elected and confirmed bishop of a diocese, for the recovery of the temporalities, or barony, of the said bishopric.

It is directed from the king to the escheator, or rather sheriff of the county.

RESTIVE, or RESTY, a term applied to a horse, &c. that stops, or runs back, instead of advancing forwards.

In the manege, a restive horse is a rebellious, refractory, ill-broken horse, which only goes where it will, and when it will. The word is formed from the Latin *restivus*, which signifies the same thing. (See **RAMINGUE.**) A horse of this sort, who has been too much constrained and tyrannized over, should be treated with the same lenity as a young colt. The spurs are improper to be used to either; instead of which a switch should be used, in order to drive him forward, as he will be thus less alarmed; because the spurs surprise a horse, abate his courage, and are more likely to make him restive than oblige him to go forward, if he refuses to do so. There is likewise another method to punish a restive horse, which is to make him go backward the moment he begins to resist. These corrections generally succeed; but the general rule is to push and carry your horse forward, whenever he refuses to advance, and continues in the same place, and defends himself either by turning or flinging his croupe on one side or the other; and, for this purpose, nothing is so efficacious as to push him forward vigorously. Berenger's Horsemanship, vol. ii. p. 29, &c. See **RIDE.**

RESTOR. See **RESTAUR.**

RESTORATION. See **RESTAURATION.**

RESTORATION, in Theology, a term applied by those who maintain the doctrine of the final happiness of all mankind, to the recovery of transgressors from a state of guilt and misery to pardon and felicity, in consequence of the penal discipline which they are doomed to endure in a future world. See this doctrine discussed under the article **HELL.**

RESTORATION Cove, in Geography, a bay on the west coast of North America, in Burke's canal, so called by Vancouver, from the 29th of May, the day of its discovery. Among the skins brought to sale at this bay were those of the animal which produces the wool, of which the garments worn by some of the Indians are made. Their length, exclusively of the head and tail, was 50 inches; and their breadth, exclusively of the legs, was 36 inches. All the skins that were brought to captain Vancouver were white, or rather of a cream colour. The pelt was thick, and of a fine texture; but from their state of mutilation, the species of animals to which they belonged could not be ascertained. The women, who appeared to be of the greatest importance, were adorned by an horizontal incision about three-tenths of an inch below the upper part of the under lip, extending from one corner of the mouth to the other; and in this slit was fixed a piece of wood, confined closely to the gums of the lower jaw, and projecting by its external surface horizontally. These wooden ornaments were of an oval form, and resembled a small oval platter or dish, concave on both sides: the smallest of them was about 2½ inches, and the largest 3¼ inches long, and 1½ inch broad; the others decreased in breadth in proportion to their length. The clothing of the natives here consisted either of the skins of the sea-otter, or of garments made of the pine-bark, into which was neatly wrought some of the fur of the sea-otter, and their sides and bottoms were decorated with various colours. In this they use only woollen yarn, very fine, well spun, and dyed for that purpose, particularly with a very

lively and beautiful yellow. N. lat. $52^{\circ} 1'$. E. long. $232^{\circ} 20'$.

RESTORATION *Island*, a small island in the South Pacific ocean, near the east coast of New Holland, discovered by captain Bligh in 1789. S. lat. $12^{\circ} 39'$.

RESTORATION *Point*, a cape on the west coast of Vashon's island. N. lat. $47^{\circ} 30'$. E. long. $237^{\circ} 46'$.

RESTORATIVE, in *Medicine*, such substances both in the way of food, drink, and medicines, which are calculated to restore the vigour of the constitution, after the cessation of acute diseases, after violent hæmorrhages, fatigue, watching, or want of food. These of course comprehend the most nutritious parts of animal substances, jellies, broths, &c.; and the vegetable starches, arrow-root, sago, &c. with milk, rice, and other light nourishment. The restorative medicines will be selected from the bitter and aromatic vegetables, and some of the metallic salts, especially those of iron; their principal use being to give tone and vigour to the digestive organs, and thus enable them to extract and digest the nutriment, which the food affords.

RESTOUN, in *Geography*, a town of Syria, anciently called "Arethufa;" 12 miles S.E. of Hamah.

RESTOW, a town of Austrian Poland, in Galicia; 72 miles W. of Lemberg.

RESTRAINING STATUTE. See **REMEDIAL**.

RESTRAINING Statute of Leases. See **LEASES by Statute**.

RESTRAINT is when an action is hindered, or stopped, contrary to volition, or the preference of the mind.

RESTRICTION, the act of modifying, limiting, or restraining a thing to narrower bounds.

General laws always bear some restriction. In contracts it is usual to have *restrictive clauses*, which bind the covenants down to certain bounds.

RESTRICTION, *Mental*. See **RESERVATION**.

RESTRICTION, among *Logicians*, is understood of the limiting a term, so as to make it signify less than it usually does.

In which sense the name philosopher is restrained to Aristotle; Great, to Alexander; City, to Rome, &c.

RESTRICTIVE PROPOSITION. See **PROPOSITION**.

RESTRICTIVE Suture. See **SUTURE**.

RESTRINGENT, in *Medicine*. See **ASTRINGENT**.

RESTY. See **RESTIVE** and **RIDE**.

RESULT, what is gathered from a conference, an inquiry, meditation, discourse, or the like; or the conclusion and effect thereof.

The usual result of disputes, Mr. Bayle observes, is, that each person remains more attached to his own opinion.

RESULTING USE, in *Law*. See **USE**.

RESUMMONS, **RESUMMONITIO**, a second summons or calling a man to answer an action, where the first summons is defeated, or suspended, by an accident; as the death of a party, &c.

RESUMPTION, **RESUMPTIO**, in a law-sense, signifies the taking again into the king's hands such lands or tenements as before, upon false suggestions, or other error, he had delivered to the heir, or granted, by letters patent, to any man.

RESUMPTION, in the *Schools*, a summary repetition, or running over, of an argument, or of the substance of it, in order to refute it.

RESUMPTION is also used by *Logicians* for the reduction of some figurative or quaint proposition, to a more intelligible and significant one.

RESUMPTIVE, in *Pharmacy*, an epithet given to a

kind of unguent, used to recruit and restore arid languishing constitutions, and to dispose the dry bodies to receive nourishment. It is called in Latin *unguentum resumptivum*.

RESUPINATUM FOLIUM, in *Botany*, a reversed leaf, has its proper under side turned uppermost, as in *Pharus latifolius*, and *Astroemeria pelegrina*. See **LEAF**.

RESUPINATUS FLOS, a reversed flower, is so circumstanced, that what, according to analogy, ought to be its upper side, is really the under. Of this *Lavandula*, Lavender, is an example, the longer lip of its corolla being uppermost, while the other, with the stamens and style, are downwards.

RESURRECTION, **RESURRECTIO**, *Resuscitation*, the act of returning to a new or second life, after having been dead.

The great argument for the truth of Christianity, and that urged with the most force and conviction for the same, is drawn from the resurrection of our Saviour. The circumstances of it are such as almost admit of a demonstration; which has accordingly been attempted on the strict principles of geometers. See Ditton on the Resurrection.

The records of the fact of our Lord's resurrection are contained in the four gospels of St. Matthew, St. Mark, St. Luke, and St. John; and though the accounts given by these historians have been charged with some discrepancies and contradictions, the difficulties occasioned by them admit of a satisfactory solution. Among those who have made attempts for this purpose, Mr. Gilbert West (*ubi infra*) is entitled to our particular notice. With this view, he states the several incidents of this wonderful event, according to the order in which they seem to have arisen. He premises with observing, that our Saviour Christ was crucified on a Friday (the preparation, or the day before the Jewish Sabbath); gave up the ghost about three o'clock in the afternoon of the same day; and was buried that evening, before the commencement of the Sabbath, which, among the Jews, was always reckoned to begin from the first appearance of the stars on Friday evening, and to end at the appearance of them again on the day we call Saturday. He adds, that, some time, and most probably towards the close of the Sabbath, after the religious duties of the day had terminated, the chief priests obtained of Pilate, the Roman governor, a guard to watch the sepulchre, till the third day was past; pretending to apprehend that his disciples might come by night, and steal away the body, and then give out that he was risen, as he had predicted while he was yet alive. Accordingly a guard was set, the sepulchre made sure, and, to prevent the soldiers themselves from conniving with the disciples, a seal was put upon the stone which closed up the entrance of the sepulchre.

Some have objected to the evangelical statement of the time that elapsed between our Lord's death and resurrection; and they say, that the resurrection happened a day sooner than the prediction imported. But in the "Trial of the Witnesses," it is alleged, that the objection is founded upon a mistake of a mode of speaking, common to the Jews and other people; who, when they name any number of days and years, include the first and the last of the days or years to make up the sum. Christ, alluding to his own resurrection, says, "In three days I will raise it up." The angels report his prediction thus: "The Son of man shall be crucified, and the third day rise again." Elsewhere it is said, "after three days;" and again, that he was to be in the bowels of the earth "three days and three nights." These expressions are equivalent to each other; for we always reckon the night into the day, when we reckon by so many days. If you agree to do a thing ten days hence, you stipulate

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stipulate for forbearance for the nights as well as days; and, therefore, in reckoning, two days, and two days and two nights, are the same thing. That the expression, "after three days," means inclusive days, is proved by Grotius in Matth. xxvii. 63, and others. The prediction, therefore, was that he would rise on the third day. Now, he was crucified, as we have already stated, on Friday, and buried; he lay in the grave the whole of Saturday, and rose early on Sunday morning. But as the objectors say, he ought not to have risen till Monday: let us try what the use of common language requires to be understood, in a like case. Suppose you were told that your friend sickened on Friday, was let blood on Saturday, and the third day he died: what day would you think he died on? If you have any doubt about it, put the question to the first plain man you meet, and he will resolve it. The Jews could have no doubt in this case; for so they practised in one of the highest points of their law. Every male child was to be circumcised on the eighth day. How did they reckon the days? The day of the birth was one, and the day of the circumcision another; and though a child was born towards the very end of the first day, he was capable of circumcision on any time of the eighth day. And, therefore, it is not new nor strange, that the third day, in our case, should be reckoned into the number, though Christ rose at the very beginning of it. It is more strange to reckon whole years in this manner; and yet this is the constant method observed in Ptolemy's canon, the most valuable piece of ancient chronology, next to the Bible, now extant. If a king lived over the first day of a year, and died the week after, the whole year is reckoned to his reign.

The order of the incidents our author conceives to have been as follows. Very early on the *first* day of the week (the day immediately following the sabbath, and the *third* from the death of Christ), Mary Magdalene and the other Mary, in pursuance of the design of embalming the Lord's body, which they had concerted with the other women who attended him from Galilee to Jerusalem, set out, in order to take a view of the sepulchre, just as the day began to break; and about the time of their setting out "there was a great earthquake," &c. (Matth. xxviii. 2—4.) During the amazement and terror that occurred, Christ came out of the sepulchre; and the keepers recovered from their trance and fled, when an angel, who till this time sat upon the stone, quitted his station on the *outside*, and entered *into* the sepulchre; and probably disposed the linen clothes and napkin in that order in which they were afterwards found, and observed by John and Peter. Mary Magdalene, in the mean while, and the other Mary, were still on their way to the sepulchre, where, together with Salome (whom they had either called upon, or met as they were going), they arrived at the rising of the sun. And as they drew near, "they said among themselves, Who shall roll us away the stone from the door of the sepulchre? for it was very great:" and they themselves (the two Marias at least) had seen it placed there two days before, and seen with what difficulty it was done. But whilst they were deliberating (for it does not appear that they knew any thing of the guard), "lifting up their eyes," being yet at some distance, they perceived it *was* already rolled away. Alarmed at so extraordinary and so unexpected a circumstance, Mary Magdalene, concluding that, as the stone could not have been moved without a great number of hands, it must have been rolled away with some design; and that this design could have been no other but to remove the Lord's body; and being convinced by appearances that this was the case, ran immediately to inform Peter and John of what she had seen, and what she suspected;

leaving Mary and Salome there, so that, if Joanna and the other women should come in the mean time, they might acquaint them with their surprize at finding the stone removed, and the body gone, and of Mary Magdalene's running to inform the two above-mentioned apostles of it. While she was going on this errand, Mary and Salome went on and entered into the sepulchre; and there saw an angel "sitting on the right side," &c. (Mark, xvi. 5—8.) After the departure of Mary and Salome came John and Peter, who, having been informed by Mary Magdalene, that the body of the Lord was taken away out of the sepulchre, and that she knew not where they had laid him, "ran both together to the sepulchre," &c. (John, xx. 4—17.) After the appearance of Christ to Mary Magdalene, to whom, as St. Mark says expressly, he appeared first, the other Mary, and Salome, who had fled from the sepulchre with such terror and amazement, that "they said not any thing to any man," (Mark, xvi. 8.), that is, as the expression may be understood, had not told the message of the angel to some (probably John and Peter, who were running with Mary Magdalene to the sepulchre, about the time that these women were flying from it, and whom in their fright they might not immediately recollect), whom they met, and to whom they were directed to deliver it, were met on their way by Jesus Christ himself, who said to them, "All hail!" &c. (Matth. xxviii. 9, 10.) These several women, and the two apostles, being now gone from the sepulchre, "Joanna, with the other Galilean women, and others with them," &c. (Luke, xxiv. 1—9, 11.), Peter, who, upon the report of Mary Magdalene, had been at the sepulchre, had *entered into* it, and, with a curiosity that bespoke an expectation of something extraordinary, and a desire of being satisfied, had observed that the *linen clothes* in which Christ was buried, and the *napkin that was about his head*, were not only *left* in the sepulchre, but carefully *wrapped up*, and laid in *several places*, and who, from these circumstances, might begin to suspect, what his companion St. John from the same circumstances seems to have believed:—Peter we say, hearing from Joanna, that she had seen a vision of angels at the sepulchre, who had assured her that Christ was risen, starting up, ran thither immediately; and knowing that the angels, if they were *within* the sepulchre, might be discovered without his *going in*, he did *not*, as before, *enter in*, but *stooping down*, looked so far in as to *see the linen clothes*; and "departed, wondering in himself at that which was come to pass." (Luke, xxiv. 12.) And either *with* Peter, or *about that time*, *went* some other disciples, who were present when Joanna, and the other women, made their report; "and found it even so as the women had said."—"The same day, two" of the disciples "went to a village called Emmaus," &c. (Luke, xxiv. 13—35.) Such, according to Mr. West, is the order in which the several incidents above related appear to have arisen: and he concludes, that by this order, in which all the different events naturally and easily follow, and, as it were, rise out of one another, the narration of the evangelists is cleared from all confusion and inconfillencies; and, moreover, the proof of the resurrection is better established by thus *separating* the women into two or more divisions, than upon the contrary supposition, which brings them *all together* to the sepulchre; for, in the last case, instead of *three different* appearances of angels to the women, and *two* of Jesus Christ, we should have but *one* of each; whereas, in the former, there is a train of witnesses, a succession of miraculous events, mutually strengthening and illustrating each other, and equally and jointly concurring to prove one and the same fact:—a fact, which, as it was in its own nature more astonishing, and in its consequences of

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the utmost importance to mankind, required the fullest and most unexceptionable evidence. Never, says our author, was a fact more fully proved; and in stating this proof, with a brevity corresponding to our limits, and yet, we trust, with a clearness answerable to the importance of the subject, we shall avail ourselves of the luminous arrangement which our author has made of the principal arguments that establish the interesting fact of our Lord's resurrection, and that rendered it credible to the apostles and first disciples; and by means of their testimony to persons of countries and ages remote from those in which it occurred. In its reference to the conviction of the apostles and first disciples, the *first* object of consideration comprehends the characters and dispositions of the persons who were themselves to be convinced, and who were to be witnesses of the resurrection to the world in general; the *second* includes the manner, *i. e.* the method and order in which the several proofs were laid before them; and the *third* is the matter of the evidence. The knowledge of the character and disposition of the apostles and disciples, for whose conviction the proofs of the resurrection were primarily designed, is necessary to evince their aptitude and their sufficiency for this purpose, and will serve to shew us, that the manner in which they were adduced, and the matter, or facts, of which they consisted, were selected with consummate wisdom. The apostles and first disciples were, for the most part, persons of low birth and mean occupations, unaccustomed to abstract reasoning and deep inquiry, and strongly possessed with the national prejudices of the Jewish religion, as it was then taught by the Scribes and Pharisees. Although it appears from many passages in the gospel history, that they were convinced by the numerous miracles which Jesus of Nazareth performed, and by the accomplishment of many prophecies in the history of his life, of his being the promised and expected Messiah; yet they were deluded by the notion prevalent among their brethren, the Jews, that the Messiah would be a temporal prince, a redeemer and ruler of Israel, who should never die. Our Saviour, in many of his discourses, laboured to undeceive them; but their prepossessions and errors were so deeply rooted, that all his efforts for this purpose proved ineffectual. He had, indeed, most circumstantially foretold his own sufferings, death, and resurrection: but it sufficiently appears, that they did not understand these predictions, until some time after their accomplishment. As, in their opinion, immortality and temporal dominion were the characteristics of the Messiah, the sufferings and death of Jesus must have convinced them, before his resurrection, that he was not the Messiah, or that person in whom they had trusted as the Redeemer and king of Israel. When he actually died according to his prediction, and his enemies seemed to have obtained a complete triumph over him, their minds must have been agitated by prejudice, doubt, perplexity, despair, and terror. The evidence, therefore, that was adapted to recover them from this state, must, in the *manner* of its being presented to them, as well as in its own nature, be of a peculiar kind: otherwise it could not have served the purpose of converting them from being incredulous and ready to desert their Master, into believers, teachers, and martyrs of the gospel. The first alarm they received was from Mary Magdalene, who, early in the morning, on the third day from the burial of our Saviour, came running to inform Peter and John, that the stone was rolled from the mouth of the sepulchre, and that the body of the Lord was removed. These two apostles hastened to the sepulchre, and having entered it, found the fact that had been announced to them actually verified. Thus were their minds prepared for the extraordinary events that afterwards occurred. The life of Jesus, they knew,

had been a life of miracles; and his death had been attended with prodigies and wonders; and yet none of them, John excepted, believed that he was risen from the dead; *for as yet* (as that apostle assures us) *they knew not the scriptures, that he must rise again from the dead*; that is, they did not understand from the prophets, that the Messiah was to rise again from the dead; being, on the contrary, persuaded, that these very prophets had foretold the Messiah should *not* die, but *abide for ever*. The next report they received was from Joanna, and her companions, who acquainted them that angels had appeared to them, and had told them that Jesus was risen, reminding them, at the same time, that Christ himself had, not only from the spirit of prophecy with which it was known that he was endowed, but from the prophets also, predicted his own sufferings and death, and rising again from the dead on the third day. But then they did not understand what was meant by his "rising from the dead." In order to explain to them the meaning of the resurrection, they were probably acquainted, in the next place, by Mary Magdalene, that she had seen, not angels only, but Christ himself. Nevertheless some doubts and difficulties still remained. He had been seen only by Mary Magdalene. To relieve them in this state of hesitation and perplexity, nothing could be better calculated than the account given by the other Mary and Salome, who had also been at the sepulchre, and had there seen an angel, who not only assured them that "Christ was risen," but had ordered them to tell his disciples, "that they should meet him in Galilee," agreeably to what he himself had said to them in his lifetime. The only scruple that now remained in the minds of the apostles, arose from their not having seen him themselves; and till they did, they seemed resolved to suspend their belief of his being risen from the dead, and treated all those visions of the women as so many idle tales. They were left for some time to ruminate over the wonderful events that had rapidly occurred, to examine the scriptures, and to recollect the predictions and discourses of their Master, to which they were referred both by the angels and himself. In order to assist them in their inquiries, and lead them to the true sense of the scriptures, the only rational means of conquering their prejudice, Christ himself appeared to two of his disciples, on their way to Emmaus, whom he found discoursing and reasoning as they went upon those very topics. The design of Christ in his conversation with these disciples, and particularly in his exposition of the prophets, was to shew, that, by the proper exercise of their understandings, they might, from those very scriptures, whose authority they allowed, have been convinced that the Messiah "ought to have suffered," as they had seen him suffer, "and to rise from the dead on the third day." That is, Christ chose rather to convince them by *reason*, than by *sense*; or, at least, to prepare their minds, that their assent afterwards to the testimony of their senses, should be with the concurrence of their reason. Having duly prepared them for receiving the testimony of their senses, he discovered himself to them by an act of devotion, "in breaking of bread;" a form of devotion which he had instituted in remembrance of his death. Accordingly they were convinced, and "returned that same hour to Jerusalem," where they found the apostles assembled together, and debating apparently upon the several reports they had heard that day, and particularly upon what Peter had told them, to whom, some time on that day, Christ had appeared. The apostles having now had every kind of evidence laid before them that was requisite to convince them of the reality of the resurrection of Christ, and being also enabled by the gift of that Spirit, which inspired the prophets, to understand the true meaning of those sacred oracles

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to which their Master constantly referred them for the marks and characters of the Messiah, which he affirmed to be found in himself; they were left again to themselves, that they might consider and examine at leisure the several proofs of the resurrection, which they had heard and seen, and particularly those arising from the accomplishment of the predictions contained in the holy scriptures. Accordingly he forebore visiting them for eight days, after which he condescended to submit himself to a farther examination, in order to remove the unreasonable scruples of St. Thomas, one of the apostles. After this there seems to have been no scruple left in the minds of any of the apostles, to whom, however, Christ was still pleased to continue his visits; "being seen of them," as St. Luke testifies (Acts, i. 3.) "forty days after his passion, and speaking of the things pertaining to the kingdom of God."

It is observable, that all the appearances of Christ already mentioned, seem to have been intended only for the conviction of his apostles; and those that follow, which were probably much more numerous than the evangelical history records, rather for their confirmation and instruction in the faith and doctrines of the gospel. The sacred writers have been very particular in their accounts of the former, whilst they have mentioned but very few of the latter; and the reason of their different proceeding is very obvious. The apostles are to be considered both as *witnesses* of the miracles, and the sufferings, the death, and the resurrection of Jesus Christ, and as *teachers* and *preachers* of his doctrine. In the character of *witnesses*, a circumstantial account of the means and opportunities they had of knowing certainly the several facts attested by them, must necessarily give great force and credit to their evidence: whereas in that of *preachers*, it is sufficient if their auditors were satisfied, in general, that the doctrines taught by them were derived from the instructions, and authorized by the commission given them by their Master, "to teach all nations;" and of this, the various gifts of the Holy Spirit, poured out, not upon the apostles only, but by them upon all believers, were full and unquestionable proofs.

From a review of the method and order in which the several proofs of the resurrection were laid before the apostles, it is manifest that Christ required of them a reasonable and well-grounded faith, and that he also pursued the most proper and effectual means for the attainment of that end. With this view, instead of bearing down their reason, and dazzling their understanding by a full manifestation of himself at once, we see him letting in the light upon them by little and little, and preparing their minds by the gradual dawning of truth, that they might be able to bear the full lustre of the Sun of righteousness rising from the grave; to consider and examine, and know that it was he himself, and to assure the world it was impossible they could be deceived. By referring them to the scriptures, and submitting himself to the scrutiny and judgment of their senses, he not only waved all authority, but required them in a strong and particular manner to exercise their reason in examining the evidence brought before them; for which purpose he also improved their faculties by the infusion of his holy spirit. Never, says Mr. West, was evidence more fairly offered to consideration: never was inquiry put into a more rational method, as indeed there never were any facts that could better abide the test.

These facts, of which the *matter* of the evidence of the resurrection consisted, may be comprised under three heads, *viz.* the appearances of the angels, the appearances of Christ to the women, and the appearances of Christ to the disciples and apostles. Our limits will only allow us briefly to recite

them. Those of the *first* class, at the sepulchre on the morning of the resurrection, are such as were observed by the Roman soldiers, who kept the sepulchre, by the other Mary and Salome, by Mary Magdalene and by Joanna, and her companions. Mr. West has satisfactorily proved, by a train of reasoning which we have not room to pursue, that these appearances of the angels were neither the effects of illusion, the phantoms of a disordered visionary mind, nor the operations of artifice and imposture. The *second* class comprehends the appearances of Christ, which were two; the first to Mary Magdalene; the second, to the other Mary and Salome. Some persons have very absurdly inferred from our Lord's prohibition to Mary, expressed in these words, "Touch me not, for I am not yet ascended to my Father," that our Saviour was not clothed with a real or material body: whereas the evident meaning of the words is "detain me not, for I am not yet ascending to my Father," and therefore they imply, that she should have another opportunity, before his departure from the world, of expressing her regard and maintaining intercourse with him. The *third* class of appearances includes those of Christ to his disciples, for the 40 days after his passion, which undoubtedly were numerous, though only few are recorded. An objection has been founded on one of these appearances, in recording which St. John says, "that Jesus came (the doors being shut) and stood in the midst," against the reality of the body of Christ; but it is needless to reply to so groundless a suggestion, as that the body of Christ passed through the solid door; when it is possible that he might enter, unperceived by them, through an open door.

The third time of our Saviour's appearance to any number of his disciples together after his resurrection was at the sea of Tiberias, called also the sea of Galilee (John, xxi. 14.); and subsequent to this was his appearance on a mountain in Galilee, mentioned by St. Matthew. One reason that has been assigned for his shewing himself in Galilee, after his resurrection, seems to have been, that, where he was personally known to so many people, having resided there above 30 years, he might have the greater number of competent witnesses to his resurrection. It is probable that the greatest number of his appearances for the 40 days after his passion were in Galilee, where he would have a favourable opportunity of discoursing to his disciples of "things pertaining to the kingdom of God," (Acts, i. 3.); and of preparing his apostles especially for testifying to the reality of his resurrection, and for executing the commission with which they were entrusted. Here they would be more secure, as well as more retired, than at Jerusalem.

It might be further urged that the resurrection of Christ was a necessary fulfilment of ancient prophecies pertaining to the Messiah, and also of our Lord's own predictions: and that it was a no less necessary appendage to his office as a teacher and favourer than his death. Without the resurrection, the great scheme of divine mercy for the benefit of mankind would have been incomplete; by that, it was perfected, and the triumph over death added to that over sin; the Messiah thus accomplishing all that the scriptures foretold of his glory and power. This event authenticates and confirms the promise of future existence, and is indeed the pledge and earnest of immortality.

But it has been objected, that all the proofs of our Lord's resurrection which have been above adduced were not exhibited to all the Jews. (Acts, x. 41.) That Christ made choice of a select number of disciples, and particularly of twelve, (who were called apostles,) to be witnesses of the great actions of his life, and especially of his resurrection, and preachers of his gospel to all the world, is a well-known and indisputable

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able fact. He not only, on many occasions, both *before* and *after* his crucifixion, discoursed to them in particular of things "pertaining to the kingdom of God," and poured upon them all the various gifts of the Holy Spirit, but gave them every kind of evidence of his "being risen" from the dead, which the most scrupulous and sceptical could imagine or require; "shewing himself alive to them by many infallible proofs," such as eating and drinking with them, "for 40 days after his passion." And, indeed, it is highly expedient that those, upon whose testimony and credit the truth of any fact is to be established, should have the fullest and most unexceptionable evidence of it, that can be had; because their having had all possible means of information must necessarily add great weight and authority to their depositions. That their perfect knowledge of the things which they were to testify was necessary for those who were ordained to be apostles, is further evident from the words of St. Peter, Acts, i. 15—26. It was the peculiar and distinguishing character of the apostles to be witnesses of the resurrection, and it was their office to testify to the reality of this fact: but all the infallible proofs of our Lord's resurrection were not vouchsafed by him to his disciples, merely from a particular favour and regard to *them*, that they might believe and be saved; but with a further view, that *others* also, by their testimony, founded on the most complete and exact information, might likewise believe and be saved. If Christ had intended nothing more than to induce his disciples to *believe* his resurrection, he might have left them to the *testimony* of the Roman soldiers; to that of the *women*; to the *writings* of Moses and the *prophets*; to his own *predictions*; to the *state* of the sepulchre, and that wonderful circumstance of his body's being *no where* to be found; and they would have been without excuse, if they had still continued unbelieving. But though the apostles had, upon *this* evidence, believed their master to be risen from the dead; yet, without those other *infallible* proofs mentioned by St. Luke, they would certainly have not been so *well* qualified for being witnesses of the resurrection to all the world: the heathens would not have admitted the *testimony* of Moses and the prophets, of whose writings they knew nothing, and of whose divine authority they had no proof. And as to the depositions of the *women*; besides their being strangers to *their* characters, they might, from Christ's appearing to *them*, with some colour have demanded, why he did not appear likewise to those whom he commissioned to *preach* his gospel, and to be *witnesses* of his resurrection. But when, on the contrary, the apostles could tell them, that they *themselves* had *seen* Christ, had *handled* him, *eat* and *drank* with him, and *conversed* with him for *forty* days *after* that he *was risen* from the dead, they could not but allow them to have had the *fullest* evidence of the resurrection, supposing what they told them to be *true*; and of this the purity of their doctrines, the holiness of their lives, their courage and constancy in defying and undergoing all kinds of hardships, dangers, pain, and death, in advancing a cause, which every worldly interest obliged them to desert, joined to the attestation of the Holy Spirit, "working with them, and confirming the word with signs following," were such assurances as no other man could give of his veracity. It has been said, however, that our Lord did not shew himself, after he was risen, to the Jews, to the chief priests and elders, to the Scribes and Pharisees, and mistakenly interpreting a passage in Matt. xii. 39, 40, Christ has been charged with a violation of his promise to this purpose. Of his rising again from the grave on the third day, the Jews had the testimony of the prophets, of the predictions of Christ himself, the evidence of the Roman soldiers, of his body's

being no where to be found, of the women and disciples, and apostles, to whom he had appeared; and who, before the Sanhedrim, bore witness to his resurrection, and having just before wrought a miracle upon a lame man (Acts, iv. 10.) declared, that they had done it in the name of "Jesus of Nazareth, whom," say they, "ye crucified, whom God raised from the dead." This surely was evidence sufficient to convince any reasonable and unprejudiced person, and, consequently, to acquit our Lord of his promise of giving that "evil generation" satisfactory proofs of his being risen from the dead. To the evidence vouchsafed by Christ, neither out of favour to those "who had forsaken all and followed him;" nor to those whom he had chosen to be "witnesses of him to all the world," they certainly could have no just pretensions; who, instead of being his disciples, had rejected his doctrine, and put him to death as an impostor and blasphemer; and instead of shewing any disposition to embrace and propagate his gospel, opposed it with all their power, and, by threats and punishments, forbade his apostles to preach any more in his name. It deserves consideration in this place, that the apostles were not chosen merely to be witnesses of the fact of our Lord's resurrection, but they were appointed to their office, and commissioned to publish it to the world, because, having often seen Christ after his resurrection, they were duly qualified for the service assigned them, and were able to testify the truth of it from their own knowledge. Although our Saviour did not think proper to appear to the people at large; that is, to the multitude of the Jews, who were the declared enemies of his person and religion, and particularly to the chief priests and magistrates, who had been the instruments of his crucifixion; he *shewed himself openly*, without reserve and disguise, to those who had been accustomed to associate with him; and to no fewer than to five hundred such persons at one time; and of the number of these were the twelve apostles, who were specially appointed to preach his doctrine, and to declare the fact of his resurrection, as a distinguishing evidence of its truth and importance. Their office commenced during the period of his public ministry; and one necessary qualification for the future exercise of it was their being able to attest his resurrection. Others might have borne a similar testimony. They were prepared and disposed to do it. But the apostles were particularly selected and ordained for this purpose.

It is a very natural inquiry, why the Jews in general, and the priests and rulers in particular, should not have had an opportunity of seeing Christ after his resurrection, and conversing with him, and ascertaining the reality of the fact? As this was the evidence of his divine mission and character, to which he had often appealed; should not those who persisted in their incredulity, notwithstanding the proofs of supernatural powers, which he had exhibited in the course of his life and ministry, have enjoyed the benefit of it? And if it had been sufficient to overcome their obstinate prejudices, would not their testimony have contributed, more effectually than any other concurring circumstance, to the conviction of mankind in general, and to the credit and influence of Christianity? This kind of reasoning, we allow, seems, on a slight and superficial consideration of it, to be very plausible; and it has been strongly urged and very pertinaciously maintained by sceptics and infidels.

Let us examine the principles upon which it is founded; and we shall perceive that it is more plausible than just, and that it will warrant the conclusion that has been drawn from it. It supposes, that the Jewish priests and magistrates had a right to expect personal evidence of our Saviour's resurrection; that some useful and important end

would

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would have been answered by its being afforded them; and that no injury to the character and religion of Christ could have resulted from their being thus indulged and gratified. If neither of these suppositions can be reasonably admitted; if, upon farther investigation, they should appear to be fallacious and unfounded; it cannot be alleged against the evidence of our Saviour's resurrection, that it was defective and partial, because it was not communicated to the Jewish priests and rulers.

The plea of right cannot be urged in their favour by any, who duly consider, what their disposition and conduct had been during our Saviour's life and ministry. Men who had discovered no inclination to examine the nature of his doctrine and the design of his mission; who had slighted and resisted the means of information and conviction, which his preaching and miracles had afforded them; and who had pursued him with malignity and violence to the cross and grave;—such men could surely have no just claims on his farther attention: they could have no reason to expect, that he would condescend to use any new efforts for removing their prejudices, when every past endeavour had not only proved fruitless, but had served to exasperate their resentment, and to provoke a persecution which terminated in his death. Their opposition to him had been such both in its nature and degree, as to render them altogether unworthy of any forbearance and indulgence. Much less discernment than he possessed would have been sufficient for perceiving, that no evidence was likely to avail with persons of their temper and character. They had justly forfeited every token of his regard. They had merited the most signal punishment. It would have been not only a vain, but an impious and daring presumption in them to expect any other evidence of his restoration to life besides that, which they might derive from the testimony of persons less guilty and more deserving than themselves. Besides, our Saviour's particular commission to the Jews expired with his death; and he had previously informed them that they should not see him till they were better disposed to receive him. Every personal claim must, in this case, be set aside.

The plea of right being dismissed as unfounded, the next question that occurs is, whether any important and valuable purpose to themselves or others, would have been answered by our Saviour's appearance to them, after his resurrection? Have we any reason to imagine, that they would have been convinced of the truth of his mission and doctrine by such an appearance? The same prejudices and interests that prevented the effect of the miracles which he had performed, and of which they had been witnesses, would have resisted the conviction, which his resurrection tended to produce. The same antipathy to the doctrine he taught and the religion he meant to establish, would have prevailed against the evidence of this fact; and it is probable, that they would have only aggravated their guilt and condemnation by obstinately persisting in their unbelief.

But though they were convinced of the reality of our Saviour's resurrection, would they avow their conviction? Would they publicly testify the truth of that fact? By an undisguised and open declaration of it, would they lead others to believe and acknowledge it? This, indeed, would have been a very signal triumph of truth over prejudice and malice. But it would have been a triumph over their own prejudice and malice, of so extraordinary a kind, that it was very unlikely to happen. Pride and interest would have been very reluctant in acknowledging that they had persecuted and murdered a divine Messenger; in renouncing the worldly rank and

influence which they possessed; and in submitting to be taught and governed by the authority of Jesus of Nazareth, whom they had despised, calumniated, and crucified. If they were constrained to assent to the truth of our Saviour's resurrection, it was not very probable that they would confess to the world, that he, whom they had persecuted during his life, and doomed to a premature and ignominious death, was the promised Messiah and Saviour. It was not very probable, that in so doing they would publish their own disgrace, and that they would proclaim to the world, that they were persecutors and murderers. It would have required a degree of virtuous fortitude, of which we discover no traces in the Jewish Sanhedrim, to bear public testimony to the resurrection of a person whom they had so lately condemned and crucified as a malefactor. Without such a testimony, of what avail would have been the conviction of their own minds to the general credit of the Christian cause? Afraid or ashamed of avowing it, and thus of forfeiting the reputation and influence annexed to their character and office, and of incurring popular censure and reproach; no benefit could have accrued from it either to their contemporaries or to future generations. They were, therefore, very unfit to be witnesses of a fact, which it was their interest to conceal, and which they were not likely to acknowledge, if they had believed it to be true.

Besides, their testimony, if truth had extorted it from them, and if they had possessed honesty and resolution sufficient to avow it, would have been liable to suspicion. It was the testimony of men whose minds must have been oppressed and terrified by a consciousness of their guilt; and it might have been said, that they were haunted by ghosts and spectres, and that their imagination converted a phantom into the real person of him whom they had exposed to public derision, and sentenced to an ignominious death. Their testimony would have gained little credit with men of their own rank and station, and of principles and characters similar to their own. It would have died with themselves; and produced no effect beyond the circle of their own acquaintance and the age in which they lived.

It ought to be considered farther, that the character and religion of Christ might have been very materially injured by his appearance to the Jewish priests and rulers, after his resurrection. They had no right to expect this kind of evidence. No good purpose could be answered by it. We now observe, that it might have been very detrimental in its effects. If they had remained unconvinced, which might most probably have been the case, the fact would have been questioned. The multitude would have become obstinate and ir reclaimable in their incredulity; and they would have pleaded the authority of their superiors in station and office, as an apology for neglecting inquiry and rejecting the means of conviction. If they had been convinced, without honesty and resolution to declare the truth, the fact would still have been considered as doubtful, or at least of no great importance. But if with their conviction they connected the public avowal of its truth, our Saviour would have incurred the charge of an impostor, and his religion of fraud. Loud would have been the clamour of a combination between him and the rulers of the state. Suspicion would have attached itself to the evidence of men, who had the care of his sepulchre, who appointed the guard, and sealed the stone that secured it, and who could easily have propagated a report, which would have gained credit with the servile multitude. Christianity would have been represented, by persons who are prone to ascribe all religion to state policy, as a contrivance of the priests and magistrates

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rates of Judea, to answer some purpose of worldly emolument or ambition. Its progress and prevalence would have been attributed to the secular influence of its advocates; and it would have been deprived of that most distinguishing and satisfactory evidence which it now possesses, that it derived its origin from God, and owed its success to the signal interposition of divine power.

Allowing that the apostles and first disciples had sufficient evidence of our Lord's resurrection, we are next to inquire, in the discussion of this interesting subject, how the fact may be ascertained to the satisfaction of those who live in ages and nations far remote from those in which it occurred. Such persons must recur for conviction, first and principally to the *testimony* of the original witnesses, chosen to announce the fact to the world, transmitted from one country and one age to another in writings, either penned by themselves, or authorized by their inspection and approbation. These writings are contained in the *Gospels*, the *Acts*, the *Epistles*, and the *Revelation*; and for proofs of their authenticity and credibility, we refer to these titles, and also to BIBLE, CANON, and TESTAMENT; and for an account of their authors, to MATTHEW, MARK, LUKE, JOHN, PAUL, PETER, &c. How far we may safely, and without danger of mistake, rely on the testimony of the witnesses of our Saviour's resurrection, thus transmitted to us, will appear, if we consider, that they were men, not only capable of knowing the truth, and duly informed concerning it, but, on account of their general character, unlikely to report and propagate a falsehood. They had been raised from private and obscure stations to the office they sustained. They were destitute of those natural talents and external advantages which suggest and favour a plan of imposture and deceit. Artless and undesigning, and unconnected with persons of extended views and worldly influence, they were unfit instruments for concerting and executing a deliberate and complicated scheme of delusion. The principles they had embraced, and the profession they had assumed, since their conversion to Christianity, were altogether incompatible with a combination to promote the prevalence of a known falsehood. Integrity and a regard to truth, under the awe of the God of truth and justice, and in the prospect of righteous judgment and retribution, were the avowed principles of their conduct; and they must have been impostors, chargeable with the most atrocious guilt and the most consummate folly, if they had proposed, by the wickedness of deceit, to promote the cause of truth and virtue. But the falsehood of asserting, that Christ was risen, was such as would never have engaged their concurrence and support. It was an event of which they had no expectation. Their prejudices and false hopes had led them to surrender their cause, as altogether defeated, when their Master submitted to death. They had either forgotten or misunderstood his predictions; and when some of them first received the report of his resurrection, they were departing from Jerusalem with dejected and despairing spirits; and they needed very peculiar evidence of the fact, before they were disposed to admit the reality of it. If Christ had not actually risen from the dead, these men would have returned to their former attachments and occupations. All their prepossessions in favour of the perpetuity of the law of Moses would have revived. Disappointed in their erroneous expectations, they would have been the less inclined to propagate an imposture.

More especially when we consider, that all their interests, as well as their prejudices, militated against their public declaration of a fact, which had never existed. Can we suppose, that they would have incurred the resentment of

the whole body of the Jews; and that they would have hazarded their lives in the support of a cause, the founder of which had deceived and betrayed them? On the contrary, we discern in the temper and conduct of the witnesses of our Lord's resurrection undeniable evidence of their conviction of its truth, and of their sincerity in avowing and publishing it. Nothing less than the evidence of truth can account for the change which they manifested both in their sentiments and conduct. Men, who a little while before were timid and despairing, become bold and fearless; declare the fact on the scene, where they report it to have happened, and in the presence of those, who, after having succeeded in procuring the crucifixion of Christ, employed all the means in their power for preventing any delusion with regard to his resurrection; and who expose themselves to persecution and death in asserting and proclaiming it. With new views, with respect to the nature and extent of the Christian dispensation; with a knowledge and zeal, with a steadiness and constancy, which indicate a consciousness of truth and an extraordinary illumination; they publish the fact, and propagate the doctrines and duties which it was designed to establish and enforce.

Besides, "the apostles wrought miracles in confirmation of the truth of their testimony." The God of truth concurred with them, and attested their credibility; and thus obviated every doubt and difficulty, which prejudice and malignity might have suggested. Every miracle they performed was a new attestation to the fact which they reported, and the extraordinary powers they possessed, and which they derived from the Sovereign of nature, qualified them for being proper witnesses of it to the world. He, who appointed them to this office, aided them in the execution of it. Their success, insufficient as they were of themselves to combat the prejudices and powers of the world, afforded an increasing and permanent evidence of the fact, on which their commission was founded. To us their testimony has descended with every sanction and with every circumstance of credibility, that can justify our assent, and our attachment to the doctrine they taught, and to the practice of the duties they inculcated.

In the prevalence and duration of Christianity, and in the prospect of its continued subsistence and increasing spread and triumph, we discern traces of its divine original: we see exulting proof of the resurrection of its founder; and we perceive reasons and motives for holding fast the profession of our faith in it without wavering. Our religion is founded on evidence, that cannot be reasonably questioned: the objections to which it is liable, furnish, on due examination, arguments in its favour. It needs only an impartial scrutiny and trial, in order to approve itself *the wisdom and the power of God*.

From the existence of the Christian religion, which we may consider as a distinct argument in proof of our Saviour's resurrection, may be deduced the same kind of evidence of this fact, as is exhibited to us of the deluge by the many petrifications of shells and bones of fishes, and other animals of distant regions, &c. found often in the bottoms of the deepest mines, and the bowels of the highest mountains; for, as it is impossible to account for those various petrifications being lodged in so many parts of the earth, some many leagues distant from the sea, others very much above the level of it, without admitting such a subversion and confusion of this globe, as could not have been occasioned by a less violent cause than the "breaking up of the fountains of the great deep, and the waters flowing above the tops of the highest hills;" so will it be extremely difficult to account for the propagation and present existence of Christianity in so many regions

regions of the world, without supposing that "Christ rose from the dead," ascended into heaven, and enabled his disciples, by the miraculous gifts of his holy spirit, to surmount such obstacles, as no mere human abilities could possibly overcome. See *CHRISTIAN Religion*. "Observations on the History and Evidences of the Resurrection of Jesus Christ," by Gilbert West, esq. "Observations on the Conversion of St. Paul," by the right hon. George lord Lyttelton. "The Trial of the Witness of the Resurrection of Jesus." Rees's Sermons, vol. i. Sermon 4.

The resurrection of Christ is a most important fact, not only as it certifies his divine mission, the character he assumed, and the truth of the doctrine he taught, but as it assures us of the reality of a future state of righteous retribution. This event exhibits a triumph over death, which proves not merely the possibility, but the certainty, of a general resurrection of mankind. It is the pledge and earnest of that restoration to life, which Jesus Christ, as a divine teacher, both predicted and promised. Many curious questions have been proposed on the mode of the future existence of mankind; as well as on the place of abode of the good and wicked (see *HEAVEN* and *HELL*); and also on the time when this interesting event shall happen. (See *SLEEP of the Soul*.) With regard to the mode of our future being, it is generally allowed, both by those who believe and those who deny the essential distinction between matter and spirit, that we shall exist hereafter in a corporeal form; but the difference between our present bodies and those in which we shall exist after the general resurrection is a subject, which, however it may have engaged the attention and employed the pens of metaphysicians and polemical theologians, is more curious than useful; and provided that we shall exist hereafter, we need not be anxious about the decision of this question. It is important merely as it relates to the doctrine of a future existence in general, the truth of which, whatever may be the conjectures of the learned, it does not invalidate.

Many Christians believe the resurrection of the same identical body, the very same flesh and bones, at the day of judgment. The two principal philosophical objections against it are these:

1. That the same piece of matter, or substance, may happen to be a part of two or more bodies. Thus a fish feeding on a man, and another man afterwards feeding on the fish, part of the body of the first man becomes first incorporated with the fish, and afterwards in the fish, with the last man. Again, instances have been known of one man's feeding immediately on another; and, among the cannibals of the West Indies, the practice has been frequent.

Now, where the substance of one is thus converted into the substance of another, each cannot rise with his whole body; and to which shall the common part be allotted?

To this objection some answer, that, as all matter is not fit or disposed to be assimilated to the body, and incorporated with it, human flesh may very probably be of this kind; and, therefore, what is thus eaten, may be again excreted, and carried off. But Mr. Leibnitz's answer seems the more solid. All that is essential to the body, he urges, is the original stamen which existed in the semen of the father; nay, and on the footing of the modern theory of generation, which existed in the semen of the first man. This we may conceive as the most minute speck or point imaginable; and therefore, not to be separated, or torn asunder, and any part of it united with the stamen of any other man. All this bulk we see in the body, is only an accretion to this original stamen; an addition of foreign matter, of new

juices, to the primary, solid stamen: there is, therefore, no reciprocation of the proper matter of the human body.

The second objection is this: the human body, we know, by the late discoveries in the animal economy, is continually changing; a man has not entirely the same body to-day as he had yesterday; and it is even computed, that in less than seven years' time, his whole body undergoes a change, and not a particle of the same body remains. Which of those many bodies, then, which the same person has in the course of his life, is it that shall rise? or does all the matter that has ever belonged to him rise again? or does only some particular system thereof? The body, *e. gr.* he had at twenty, at thirty, or at sixty years old? If only this or that body arise, how shall it be rewarded or punished for what was done in the other? with what justice does one person suffer, &c. for another?

To this it may be answered on Mr. Locke's principles, that personal identity, or the sameness of a rational being, consists in self-consciousness; in the power of considering itself the same thing in different times and places. By this every one is to himself what he calls *self*; without considering whether that self be continued in the same or divers substances. So far reaches the identity of that person. It is the same self now it was then; and it was by the same self which now reflects on an action, that action was performed.

Now, it is this personal identity that is the object of rewards and punishments, which we have observed may exist in different successions of matter; so that to render the rewards and punishments just and permanent, nothing needs but that we rise again with such a body as that we retain the consciousness of our past actions.

RESUSCITATION. See **RESURRECTION**, and **REVIVIFICATION**.

RESUSCITATION of Plants, in *Chemistry*, the art of reproducing a plant from its ashes. See **PALINGENESIA**.

Many have pretended to this art, and have shewn resuscitated plants in vials; but all these seem only particular instances of artificial chemical vegetations, of which many others may be given. The external appearances of these resemble plants, and the ignorant may easily take them for such; but when closely considered, there is a great difference to be found. See **Artificial VEGETATION**.

RETAIL, in *Commerce*, &c. the buying of goods in the great, or by wholesale, and selling them out again in small parcels.—"Qui rem integram ementes, per minutiores eam partes distrahebant."

RETAIN, *To*, spoken of mares, signifies *to hold*, *i. e.* to conceive after covering.

RETAINER, in *Law*, a servant not menial or domestic, that is, not continually dwelling in the house of his lord and master, but only wearing his livery, and attending on special occasions.

This livery was anciently given by a great man, and frequently for the maintenance of quarrels; whence it was justly prohibited by several statutes; as under Richard II. on pain of imprisonment, and grievous forfeiture to the king.

It was further prohibited by other statutes of the succeeding kings, by which the delinquents were subject to make ransom at the king's pleasure; and knights and esquires hereof duly attainted were to lose their said liveries, and forfeit their fees for ever.

Edward IV. added a special penalty of five pounds *per month* on every man that gave such livery, and as much on every person so retained, either by writing, word, or

oath. But most of these statutes are repealed by a statute 3 Car. I.

RETAINER of Debts, a remedy which the law gives to an executor or administrator for the debt, by allowing him to retain so much as will pay himself, before any other creditors whose debts are of equal degree. (See DEBT.) The debts of co-executors shall be discharged in proportion. An executor of his own wrong shall not, in any case, be permitted to retain.

RETAINING-FEE, is the first fee given in any cause to a serjeant or counsellor at law, by which to make him sure, that he shall not be on the contrary side.

RETALIATION, RETALIATIO, the act of returning like for like. See TALIONIS Lex.

When a nation cannot obtain justice, either for a loss or an injury, it has a right to do itself justice. But before it declares war, there are various methods practised among nations for obtaining satisfaction. Among these is that called the law of retaliation, according to which we make another suffer exactly so much evil as he has done. Many have extolled this law, as being derived from the most strict justice; and can we be surprised at their having proposed it to princes, when they have even dared to give it for a rule to the Deity himself! The ancients called it the law of Rhamanthus. Although a nation may punish another which has done it an injury, if it refuses to give just satisfaction; yet it has not a right to extend the penalty beyond what is required by its own safety. Retaliations, unjust between private persons, would be much more so between nations, because here the punishment would, with difficulty, fall on those who have done the injury. What right would you have to cut off the nose and ears of the ambassador of a barbarian, who had treated yours in the same manner? As to those reprisals in time of war, which partake of the nature of retaliation, they are justified on other principles. (See REPRISALS.) All that is true in this idea of retaliation is, that every thing be equal; the pain ought to bear some proportion to the evil required to be punished; the end and even the foundation of punishment requiring thus much.

RETARDATION, RETARDATIO, in *Physic*, the act of retarding; that is, of delaying the motion or progress of a body, or of diminishing its velocity.

The retardation of moving bodies arises from two great causes, the *resistance of the medium*, and the *force of gravity*.

The **RETARDATION from the Resistance** is frequently confounded with the resistance itself; because, with respect to the same moving body, they are in the same proportion. See RESISTANCE.

With respect to different bodies, however, the same resistance often generates different retardations. For if bodies of equal bulk, but different densities, be moved through the same fluid with equal velocity, the fluid will act equally on each; so that they will have equal resistances, but different retardations; and the retardations will be to each other as the velocities which might be generated by the same forces in the bodies proposed; that is, they are inversely as the quantities of matter in the bodies, or inversely as the densities.

Suppose, then, bodies of equal density, but of unequal bulk, to move equally fast through the same fluid, their resistance increases according to their superficies; that is, as the squares of their diameters. But the quantities of matter are increased in proportion to the cubes of the diameters: the resistances are the quantities of motion; the retardations are the celerities arising from them; and dividing the quantities of motion by the quantities of matter, you will have

the celerities; therefore the retardations are directly as the squares of the diameters, and inversely as the cubes of the diameters; that is, inversely as the diameters themselves.

If the bodies be equal, move equally swift, and are of the same density, but move through different fluids, their retardations are as the densities of those fluids.

And when bodies equally dense, and of equal bulk, are carried through the same fluid with different velocities, the retardations are as the squares of the velocities.

The **RETARDATION from Gravity** is peculiar to bodies projected upwards. A body thrown upwards is retarded after the same manner as a falling body is accelerated; only, in the one case, the force of gravity conspires with the motion acquired; and in the other, it acts contrary to it.

As the force of gravity is uniform, the retardation from that cause will be equal in equal times.

Hence, as it is the same force which generates motion in the falling, and diminishes it in the rising body, a body rises till it has lost all its motion; which it does in the same time in which a body falling would have acquired a velocity equal to that with which the body was thrown up.

Thus, also, a body thrown up will rise to the same height, from which falling, it would acquire the velocity with which it is thrown up; therefore the heights, which bodies thrown up with different velocities can rise to, are to each other as the squares of the velocities.

Hence, the retardations of motions may be compared together: for they are, first, as the squares of the velocities; secondly, as the densities of the fluids through which the bodies are moved; thirdly, inversely, as the diameters of those bodies; lastly, inversely, as the densities of the bodies themselves.

The numbers in the ratio compounded of those ratios, express the proportion of the retardations; multiplying the square of the velocity by the density of the fluid, and dividing the product by the product of the diameter of the body multiplied into its density; and working thus for several motions, the quotients of the divisions will have the same compound ratio to one another.

RETARDATION of Motion, Laws of. 1. If the motion of a body be uniformly retarded, that is, if its celerity be diminished equally in equal times, the space it passes over is one half of that it would pass over in the same time by an uniform motion.

2. The spaces described in equal times by an uniformly retarded motion, decrease according to the uneven numbers 9, 7, 5, 3, &c. See ACCELERATION and MOTION.

RETCH, or RETCHES, a name given by our farmers to an iron, or a pair of irons, which in the common plough serve to fasten the sheet to the beam. The retches are fastened to the sheet with nails, and to the beam with pins.

RETCHANI, in *Geography*, a town of Russia, in the government of Pilcov; 16 miles S. of Tropetz.

RETCING, or REACHING, the effort or endeavour to vomit. See NAUSEA.

RETCHNA, in *Geography*, a circar or province of Hindoostan, situated between the rivers Rauvee and Chunaub; in which are the cities of Lahore, Ameenadab, Sealcot, and several other towns.

RETE MALPIGHII, in *Anatomy*, the network composing the cellular structure of the lungs.

RETE Mirabile, the plexus of vessels formed by the internal carotid arteries of animals, before they branch out to the brain. See MAMMALIA.

RETE Mucosum, the soft delicate layer of the integuments interposed between the cuticle and the true skin, in which

which the colour of the skin refides. This part is much thicker in the dark coloured than in the light races of man, and is black in the Negro. See INTEGUMENTS.

RETE *Testis*, a part of the excretory apparatus of the testicle. See the description of that gland in the article GENERATION.

RETE *Penny*, in *Ancient Records*, a customary due of one penny for every person to the parish priest.

RETEH, or ARRATAMA, in *Geography*, a district of Africa, in the country of Sugulmeffa.

RETEINER, or RETAINER. See RETAINER.

RETENEGI, in the *Materia Medica*, a name used by Avicenna, and others, to express the common resin of the pine, or fir-tree, and sometimes common black pitch. The lexicographers have given us *storax* as the explanation of retenege, but this is not warranted by any passage in the authors who use the word. It is certain, indeed, that the generality of authors have confounded the several sorts of resin and pitch-making trees together, and among them the pine, fir, cedar, and turpentine trees, are called by the same name, but the storax-tree is never included among the number. These were only confounded together, because of the similitude of the things they produced; but the storax was too different from all these, and too precious a gum not to be distinguished.

RENTA, a word used by the medical writers to express things retained in the body, or which are not to be retained in a state of good health.

RETENTIO, RETINENTIA, in our law-books, is sometimes used to signify retinue.

RETENTION, RETENTIO, a faculty of the human mind, by which, in order to a farther progress in knowledge, it keeps or retains those simple ideas, which it before received by sensation or reflection.

This is done two ways. First, by keeping the idea which is brought into the mind for some time actually in view. This is called *contemplation*.

Secondly, by reviving those ideas in our minds, which have disappeared, and have been, as it were, laid out of sight. This is *memory*, which is, as it were, the repository of our ideas.

RETENTION is also used, in *Medicine*, &c. for the state of contraction in the solids, or vascular parts of the body, which makes them hold fast their proper contents.

In this sense, retention stands opposed to evacuation and excretion.

Retention and excretion make two of the non-naturals.

RETENTION is also frequently considered as a disorder, and defined the act of retaining the excrements, humours, &c. so as they cannot be voided out of the body. See INFANT.

It is the retention of peccant humours which causes such a disease.

RETENTION of *Urine*. See URINE, *Retention of*.

RETFORD, EAST, in *Geography*, a market and borough-town in North Clay division of the wapentake of Basselaw, county of Nottingham, England, is situated on the eastern bank of the river Idle, at the distance of 29 miles N.N.E. from Nottingham, and 145 miles N. by W. from London. Retford consists of two distinct parts, or districts, respectively named, from their position to the river, East and West Retford; the former of which is strictly the market-town, and the latter a separate parish, or suburb. Edward II. granted to the burgesses the right of choosing bailiffs for the government of the town; and Henry III. granted them a fair. By a charter from Henry VI., the bailiff was empowered to hold a court of record, and to

execute the office of escheator and clerk of the market. These immunities have since been confirmed, and others added by James I.; under whose charter, Retford is now governed by two bailiffs, a steward, twelve aldermen, two chamberlains, a town-clerk, and two serjeants at mace. The bailiffs and steward for the time being are justices of the peace, and of the quorum, within the borough. Retford sends two members to the national senate, and these are chosen by about 150 voters, composed of the bailiffs, aldermen, and freemen. Like most other small boroughs, it has occasionally been the scene of warm election contests. This place first exercised the right of representation in the early part of the reign of Edward II.; but it seems to have allowed this privilege to remain dormant from the ninth year of that king till the thirteenth year of queen Elizabeth, when the same was resumed, and has continued to be regularly exercised ever since. Formerly the county assizes were held here; but of late years all criminal trials have taken place at Nottingham, the county town.

Retford market-day is Saturday, weekly; and there are, besides, two annual fairs for horses and black cattle, held on the 23d of March and the 2d of October. At the commencement of the last century, a considerable malting business was carried on here; but Workop has occasioned its decline. At present, Retford is supported principally by its hat and sail-cloth manufactories. Major Cartwright some years ago established a worked mill in the immediate vicinity; but the project, having proved unsuccessful, has been abandoned. An agricultural society was established here in 1799, under the auspices of the duke of Portland, viscount Newark, colonel Eyre, and others.

The public buildings in Retford are the town-hall, Slosswick hospital, a free-school endowed by Edward VI., an alms-house for twelve poor women, and the parish church. The last, called the corporation church, is a small, but neat, edifice, in the English style of architecture, though much modernized, particularly in the interior. The living is a vicarage, in the patronage of the duke of Devonshire.

On the western bank of the Idle, and connected with the borough by a handsome modern bridge, is the village of West Retford, which, however, is altogether distinct from East Retford, both as to civil and ecclesiastical jurisdiction. Here is an hospital, which was founded in 1666 by John Dorrel, M.D., for sixteen poor persons, who are allowed annually 10*l.* each, besides clothing, coals, &c. Much injury was done to this village by a heavy flood, which occurred in 1795; but it is nevertheless a very thriving place, as well as East Retford, and derives considerable advantage from its proximity to the Chesterfield canal. West Retford Hall, a seat of the Emerson family, is the most conspicuous ornamental object in the immediate neighbourhood. St. John's well, a mineral spring about a mile from Retford, has been long famed for its medicinal qualities. South-east of Retford is Grove-Hall, the seat of Anthony Hardolph Eyre, esq., M.P. for the county. The house is seated on an eminence in a finely wooded park. Thoroton's History of Nottinghamshire, folio, 1663, republished with large additions by John Thosby, 3 vols. 4to. vol. iii. Beauties of England and Wales, vol. xii. by Mr. Laird.

RETHEL, a town of France, and principal place of a district, in the department of the Ardennes; before the revolution, the capital of a small country, called the "Retelois." The place contains 4862, and the canton 12,473 inhabitants, on a territory comprehending 200 kilometres, in 23 communes. N. lat. 49° 30'. E. long. 4° 27'.

RETHEM, a town of Westphalia, in the principality

of Luneburg Zell, on the Aller; 32 miles W. of Zelle. N. lat. $52^{\circ} 51'$. E. long. $9^{\circ} 18'$.

RETHONDES, a town of France, in the department of the Oise; 5 miles N.E. of Compeigne.

RETHWISCHE, a town of the duchy of Holstein; 25 miles N.E. of Hamburg.

RETI, in *Hindoo Mythology*, a personification of Affection, and the fabled consort of Kama, the god of love. She is represented in pictures as a beautiful woman, on horseback sometimes, and in the act of throwing a lance. Allusions to this goddess, proverbial for beauty, occur very frequently in Hindoo writings. Under the article RADHA, that lovely goddess describes the glances of her eye as "keener than the arrows darted by the husband of Reti." She sometimes is styled "mother of Kama." That appellation occurs in the article RUMKA of this work. Kama is often called "he who loveth the goddess Reti." On the occasion of the combustion of the god of love, as noticed under KAMA, the lamentations of the afflicted Reti are very touchingly related by the celebrated Kaidasa, author of Sakuntala. A whole book of his poem, entitled "Kumara-fambhava, or the Birth of Kumera," is occupied with her tender sorrows. This book fir W. Jones's teacher, a learned Vaidya (see VAIDYA), was refrained from reading; considering the ceremonies of a marriage, that of Kama and Reti, at which Brahma himself officiated as father of the bridegroom, as too holy to be known by any but Brahmans. An instance somewhat similar, of a book being too holy to be read by individuals of an inferior class, is given under RAMAYANA. Farther particulars connected with the interesting goddess, the subject of this article, will be found under KAMA, KRISHNA, and PRADYAMNA.

RETIARI, in *Antiquity*, a kind of gladiators, thus denominated from a net which they made use of against their antagonists, who were called *secutores*, and sometimes *myrmillones*. See GLADIATOR.

The word is formed from the Latin, *rete, net*; or perhaps from *retejaculum*; for they call their net *jaculum*, and sometimes in one word *retejaculum*.

This net they carried under their buckler, and, when opportunity served, cast it over the head of their antagonist, and, in this condition, killed him with a trident, or three-grained spear, which they bore in the other hand.

Lipius and others observe, that they fought in tunics, and were furnished with sponges to wipe off the sweat, blood, &c. and to stop their wounds.

RETICENCY, RETICENTIA, a figure in *Rhetoric*, by which we make oblique mention of a thing, in pretending to pass it over unmentioned.

Thus: *to say nothing of the nobility of his ancestors: I forbear to speak of his courage, and pass over the severity of his morals.* See APOSIOPESIS and PRETERITION.

RETICULA, RETICULE, in *Astronomy*, a contrivance for the exact measuring of the quantity of eclipses, introduced several years ago by the Royal Academy of Paris. See ECLIPSE.

The reticule is a little frame, consisting of thirteen fine silken threads, equidistant from each other, and parallel; placed in the focus of object-glasses of telescopes; that is, in the place where the image of the luminary is painted in its full extent. Of consequence, therefore, the diameter of the sun and moon is by this seen divided into twelve equal parts or digits; so that, to find the quantity of the eclipse, there is nothing to do but to number the luminous and the dark parts.

As a square reticule is only proper for the diameter, not for the circumference of the luminary, it is sometimes

made circular, by drawing six concentric equidistant circles. This represents the phases of the eclipse perfectly.

But it is evident, that the reticule, whether square or circular, ought to be perfectly equal to the diameter or circumference of the sun or star, such as it appears in the focus of the glass, otherwise the division cannot be just. Now this is no easy matter to effect, because the apparent diameter of the sun and moon differ in each eclipse; nay, that of the moon differs from itself in the progress of the same eclipse.

Another imperfection in the reticule is, that its bigness is determined by that of the image in the focus; and of consequence it will only fit one certain magnitude.

But M. de la Hire has found a remedy for all these inconveniencies, and contrived that the same reticule shall serve for all telescopes, and all magnitudes of the luminary in the same eclipse. The principle on which his invention stands is, that two object-glasses applied against each other, having a common focus, and there forming an image of a certain magnitude, this image will increase in proportion as the distance between the two glasses is increased as far as a certain limit.

If, then, a reticule be taken of such a magnitude, as just to comprehend the greatest diameter the sun or moon can ever have in the common focus of two object-glasses applied to each other, there needs nothing but to remove them from each other, as the star comes to have a less diameter, to have the image still exactly comprehended in the same reticule.

Another improvement is, that whereas the silken threads are subject to swerve from the parallelism, &c. by the different temperature of the air; a reticule may be made of a thin looking-glass, by drawing lines or circles on it with the fine point of a diamond; which shall be safe from any alteration of the air. See MICROMETER.

RETICULAR BODY, *corpus reticulare*, in *Anatomy*, a body of vessels lying immediately under the cuticle or scarf-skin. See INTEGUMENTS.

RETICULAR PLEXUS, *plexus reticularis*, sometimes denotes the choroides, which is thus called, because its fibres are interwoven like a net.

RETICULARIA, in *Botany*, a genus of *Fungi*, named by Bulliard, from the reticulated appearance of its structure when ripe. It is the LYCOGALA of Micheli, Persoon, and others; see that article.

RETICULARIS MEMBRANA, in *Anatomy*, a name sometimes given to the cellular substance. Dr. Hunter speaks of the cellular substance, which contains no fat, under this name, giving the appellation of adipous cellular substance to the other.

RETICULUM, in *Comparative Anatomy*, one of the divisions of the stomach in ruminating animals, so called from the reticulated arrangement of the folds of its internal membrane. See MAMMALIA.

RETIERS, in *Geography*, a town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the district of Vitré; six miles W.S.W. of La Guerche. The place contains 2384, and the canton 14,638 inhabitants, on a territory of $237\frac{1}{2}$ kilometres, in 10 communes.

RETIMO, a town of the island of Candia, built on the ruins of the ancient Rithymna. The environs of this town afford prospects that are very picturesque:—gardens planted with orange-trees, among which rise some date-trees; fields covered with olive-trees and kitchen-garden plants; rising grounds, on which the vine, the fig-tree, and the mulberry-tree, and the almond-tree grow together; and farther

farther on, wooded mountains:—to the west, the citadel, the harbour, and the sea. In a word, every thing concurs to render Retimo the most agreeable town in the island. It would also have become, perhaps, the richest, and the most populous, if the harbour, small as it is, had been kept in order. At present it is only practicable for the barks of the country; ships remain in the road, but rarely anchor here; and thus Retimo, which, from its position, the abundance of oil which is collected in its vicinity, and the other productions of its territory, might be an important place of trade, has, as well as Candia, seen a part of its population pass to Canea. Its present population, says Ohvier, consists of from 5 to 6000 inhabitants, half Greeks, half Turks: the Jews here are not so numerous as at Candia.

This town, weakly defended, was plundered and ravaged by the Turks, as far back as the year 1572, while Selim II. was causing the siege of Famaguita, in Cyprus, to be pushed on with vigour; but it was not till the reign of Ibrahim, in 1645, that the Venetians were driven from it for ever; 40 miles W. of Candia. N. lat. $35^{\circ} 20'$. E. long. $24^{\circ} 21'$.

The province of Retimo is one of the best cultivated and most productive of the island; it furnishes a great deal of oil, a little barley and wheat, and a tolerably large quantity of wine. The rising grounds and hills which skirt the shores of Armiro are almost all covered with vines. On the nearest mountains which lie to the south, is a forest of common and native oaks, maples, and carob-trees, into which the inhabitants of Retimo come to cut the wood, of which they stand in need. To the south of Retimo are the two provinces of Aion-Vassali and Amuri, the only ones that are comprised in this pachalic; they furnish wheat, barley, oil, and some fruits. The former, situated to the N.W. of the other, furnishes, besides, excellent cheese, which is confounded in trade with that of Sphachia. The Greeks are more numerous than the Turks in the provinces of Aion-Vassali and Amuri. Olivier and Sonnini.

RETINA, in *Anatomy*, a membrane of the eye, formed by the expansion of the optic nerve, and constituting the immediate organ of vision. See EYE.

RETINA, in *Optics*. The retina is usually supposed to be the great organ of vision, which is effected by means of the rays of light reflected from each point of the objects refracted in their passage through the aqueous, vitreous, and crystalline humours, and thus thrown on the retina, where they paint the image of the object; and where they make an impression, which is continued thence, by the fine capillaries of the optic nerves, to the sensory. See EYE and VISION.

Indeed, whether the retina, or the choroides, be the principal organ of vision, and that on which the images of objects are represented, has been much controverted between several members of the Royal Academy; particularly Messrs. Mariotte, Pecquet, Perrault, Mery, and de la Hire. Mariotte first referred vision to the choroides, and was seconded by Mery; the rest asserted the cause of the retina.

The retina was always judged to have all the characters of the principal organ. It is situated in the focus of the refraction of the humours of the eye; and of consequence receives the vertices of the cones of rays, proceeding from the several points of objects. It is very thin, and consequently very sensible. It has its origin from the optic nerve, and is itself wholly nervous; and it is the common opinion, that the nerves are the vehicles of all sensations. Lastly, it communicates with the substance of the brain, where all sensations terminate.

As to the choroides, its use was supposed to be to stop the rays, which the extreme tenuity of the retina should let pass; and to do the same office with respect to the retina, which the quicksilver does to a looking-glass; especially in those animals in which it is black.

But from an experiment of a cat plunged into water, M. Mery conceived a different opinion. (See PUPIL.) He observed the retina to disappear absolutely on that occasion, as well as all the other humours of the eye; while the choroides still appeared distinctly, and even with all the lively colours which it has in that animal. Hence, he concluded, that the retina was as transparent as the humours, but the choroides opaque; consequently the retina was not a proper instrument to terminate and stop the cones of rays, or to receive the images of objects; but that the light must pass through it, and could only be stopped on the choroides; which therefore would become the principal organ of vision. The black colour of the choroides in man is extremely favourable to this opinion; the principal organ should seem to require, that the action of the light should terminate on it as it arrives; which it is certain it here does in the black, that absorbs all the rays, and reflects none; and it should also seem necessary, that the action of the light should be stronger on the organ of sight than any where else: now it is certain that the light, being received and absorbed in a black body, must excite a greater vibration there than any where else; and hence it is that black bodies are kindled by a burning-glass much sooner than white ones.

The situation of the choroides behind the retina is another circumstance on its side; M. Mery having observed the same position of the principal organ behind a mediate organ in the other senses, which makes an happy analogy. Thus the cuticle extended over the skin is the mean organ of feeling; but the cutis underneath is the principal organ. The like is observed in the ear, nose, &c.

The retina, therefore, should seem a kind of mediate or secondary organ, serving to break the too strong impression of the light on the choroides, or to preserve it; which is the use ascribed to the cuticle. Add to all this, that the retina is insensible, as having its origin from the medullary substance of the brain, which is so too; and the choroides, on the contrary, is very sensible, as arising from the pia mater, which is certainly sensible in a great degree.

This last argument being doubted of, M. Mery was engaged to prove it; which he did before the Royal Academy, where he shewed that the optic nerve is not composed, like the other nerves, of fibres; that it is only a train of the medulla inclosed in a canal, out of which it is easily separable.

This structure of the optic nerve, hitherto unknown, shews that the retina can be no membrane; it is only a dilatation of the medulla, inclosed under two membranes; and a pith or medulla seems no proper substance to be the seat of sensation. It can scarcely serve for any thing but to filtrate the spirits necessary for the action of vision. The vibration, by which the sensation itself is effected, must be made on a part more solid, more firm, and more susceptible of a brisk impression.

For other arguments in favour of the choroides being the seat of vision, see CHOROIDES.

RETINA, *Paralytic*, and *Diseased*. See GUTTA SERENA. RETINACULUM, the name of a chyrurgical instrument used in castration, and in the operation for a hernia, to prevent the intestines from falling into the scrotum.

RETINARIA, in *Botany*, was so called by Gærtner, from *rete*, a net, or rather more immediately perhaps from the

the anatomical word *retina*, applied to the nervous network of the eye. This genus was founded, by the above author, on a fruit given him by professor Hermann, and said to belong to a climbing shrub of the Mauritius. So nearly do Gærtner's plate and description approach to the fruit of *Gouania domingensis*, that we have no doubt of their belonging to some species of the same genus; probably to one that we have described in our article *GOUANIA*, though, possessing none but the *domingensis* in fruit, we cannot exactly appropriate Gærtner's synonym. He seems not to have been acquainted with the fruit of a *Gouania*.

RETINASPALTUM, in *Minerology*, a name given to an inflammable kind of resinous substance, accompanying Bovey coal. It has a pale brown ochre-yellow colour, is very brittle, and breaks with a vitreous fracture. Its specific gravity is 1.135. When held in the hand for some time, it emits a slightly resinous smell, but when burned it has a fragrant odour; at last the smell is bituminous. On the first application of heat it melts and smokes, and then burns with a bright flame. When the melted mass is cooled, it is black and brittle, and breaks with a glassy fracture. It is not acted on by water, but is partly dissolved by alcohol, potash, and nitric acid; the dissolved portions having the properties of a resin; the undissolved of asphaltum. It was analysed by Mr. Hatchett, and is composed of

55 Resin,
41 Asphaltum,
3 Earths.

A similar substance occurs in the wood coal at Cologne, and was also recently discovered in making the excavation for the Tunnel at Highgate. It may be doubted, however, whether these substances are more entitled to be ranked among minerals than the other vegetable matters found in alluvial ground.

RETINUE, **RETINENTIA**, the attendants or followers of a prince, or person of quality, chiefly in a journey.

In *Law*, those persons are properly said to be of a nobleman's retinue, who belong to him in quality either of servants or retainers.

RETIRADE, in *Fortification*, a kind of retrenchment made in the body of a bastion, or other work, which is to be disputed inch by inch, after the first defences are dismantled. It usually consists of two faces, which make a re-entering angle. When a breach is made in a bastion, the enemy may also make a retirade, or a new fortification behind it.

RETIRED FLANK. See **FLANK**.

RETIRED List, a list on the marine establishment, on which superannuated officers are placed.

In the East India service, the company have resolved that a military officer, after 20 years' actual service in India, who comes to Europe upon leave, may be allowed to retire on the pay of his rank, provided he signifies his intention of so doing, within 20 months after his arrival. Officers on leave who are desirous of retiring, and who declare their intention to that effect, within 12 months from their arrival, will be permitted to retire on the pay of the rank to which they may be intitled at that period. An officer having completed 22 years' residence in India will be allowed to retire on the full pay of his rank, directly on his leaving India.

RETMANDORF, or **RADOVELZA**, in *Geography*, a town of the duchy of Carniola, on the Save; 52 miles W. of Cilley. N. lat. 46° 22'. E. long. 14° 5'.

RETENVILLER, a town of France, in the department of the Somme; four miles N.E. of Roze.

RETORBIO, a town of Italy, in the Pavese; 14 miles S. of Pavia.

RETORNO Falso Brevium, in *Law*. See **FALSO**.

RETORNO Habendo, &c. See **RETORNO habendo**, and **REPLEVIN**.

RETORT, **RETORTA**, in *Chemistry*, a kind of crooked matrass, or a round bellied vessel, made of earth, glass, or metal, with a slender crooked beak or neck, to which the recipient is to be fastened.

From this form this vessel has been probably called a *retort*. The most capacious part is called the belly; its upper part the arch or roof of the retort; and the bent part, which makes with the belly an angle of about sixty degrees, is the neck; and the passage from the belly to the neck should be free and wide, and gradually diminishing to the extremity of the neck or mouth of the retort. Retorts differ in form and materials; their bellies are generally round; some of them are oblong, and shaped like a cucurbit, and these are called *English* retorts. They are preferable for the distillation of matters which are subject to swell, and to pass into the receiver before they be decomposed.

A retort, which has a little hole pierced in its roof, is called a *tubulated* retort. This hole must be capable of being exactly closed with a stopper of proper materials. Retorts of this kind are employed in distillations, where some matter must be introduced into the retort after the receiver is joined to it, as in the distillation of smoking marine acid, and in the operations for procuring the several kinds of clyffus.

When the retort is of glass, it is usually covered with a lute of loam, &c. an inch thick, to enable it to bear the fire the better; and it is used for all operations which require a less heat than is sufficient for its fusion. Earthen retorts are necessary when great heat is requisite, as in the preparation of phosphorus.

The retort seems to draw spirits and oil from woods, gums, minerals, earths, and other matters which require a strong fire.

The retort is a kind of compendium or improvement on the cucurbit and bolt-head; answering all the purposes of both, without the assistance of a capital or head, which the other require.

The quantity of air arising from some substances is apt to burst glasses in distilling; Dr. Browne Laagrish has, therefore, given us a new contrivance of applying receivers to retorts, by which such accidents may be prevented. To his first receiver he adapts a second, inserted into an opening at the top of the first, in order to give more room to the rarefied and new generated air. To an opening at the bottom of each of these receivers, he fixes a bottle, tied on close by means of a bladder, so that they may be removed at any time, and another instantly placed in their room; by which means very little of the steam will escape. He also ties on a bladder to an opening, or upper neck of the second recipient; and this bladder being much thinner and weaker than any of the glasses, will always give way first, and prevent their bursting. And even when there is the greatest danger of this accident, the smallest pin-hole made through the top of the bladder, as soon as the fumes begin to rise, will be sufficient to let out the air as fast as it is generated. See *Philos. Transact.* N° 475. sect. 3. where we have a figure of the whole apparatus. For a farther account of the retort, and the uses to which it is applied; see **DISTILLATION** and **LABORATORY**.

RETORTION, in *Political Economy*, When a sovereign is not satisfied with the manner in which his subjects are treated by the laws and customs of another nation, he is at liberty to declare, that he will treat the subjects of that nation in the same manner as his are treated. This is what

is called the "law of retortion;" in which there is nothing that is not conformable to just and sound politics; for no one can complain of being treated as he treats others. This law of retortion may also take place with regard to certain regulations, of which we have no right to complain, and which we are even obliged to approve, though it is proper to guard against their effects, by imitating them. Such are the orders relating to the exportation of certain commodities or merchandize. It is also frequently not convenient to make use of retortion; in this respect we ought to follow the dictates of prudence.

RETOW, in *Geography*, a town of Samogitia; 12 miles W. of Medniki.

RETRACTATION, RETRACTATIO, the act of un-faying what a person had said or written.

Galileo made a public retractation of his doctrine of the world, *De Mundo*, after its being censured and condemned by the pope. See COPERNICUS and GALILEO.

Among St. Augustine's works is a book of "retractations;" where, however, the word is to be understood in a new sense; not as if he recanted or unsaid any thing he taught, but only treated of the same matter, or handled the same subject, a second time. This sense the word will very well bear; being a compound of *re*, *again*, and *tracto*, *I handle, treat of*.

RETRACTION, RETRACTIO, formed from *retrahere*, *to draw back*, in *Anatomy*, the contraction or shortening of a part. A retraction of the nerves takes away the use of the limbs.

RETRACTS, among *Horsemen*, pricks in a horse's feet, arising from the fault of the farrier in driving nails that are weak, or in driving them ill-pointed, or amiss.

These, unless timely prevented, fester, and prove very dangerous. When the farrier, in shoeing, perceives the horse to shrink at every blow on the nail, it is a sign of a retract, and the nail is to be pulled out again; which is done without any harm.

When the horse halts immediately after he is shod, it is concluded some of the nails press the veins, or touch him in the quick.

To find where the grievance lies, they knock the nails round with a hammer, till the horse's shrinking upon hitting a particular nail discovers the place.

Some farriers give this as a rule, that throwing water on the hoof, the place where he is hurt will be dry sooner than any of the rest. The places where the horses are most usually pricked, are, the heel in the fore-foot, and the toe in the hind-foot.

RETRAHENS, in *Anatomy*, a muscle of the external ear. See EAR.

RETRAXIT, in *Law*, is where the plaintiff comes into court in person, alone, or with the defendant; and declares he will proceed no farther in his action.

A retraxit is peremptory, and a perpetual bar, and may be pleaded as such to the plaintiff in the same action for ever. See NONSUIT.

RETREAT, in *Ornamental Gardening*, any sort of erection, place, or convenience, formed in gardens or pleasure grounds for the purpose of recreation and amusement. These are of very different kinds, according to the nature of the particular grounds or gardens, their circumstances, and situations; as covered, open, or in other forms, as the taste of the proprietor or designer may direct. They may be made either in the different quarters, centre parts, angles, or other places of these situations, or formed in the range of hot-houses, as is the case in some instances. The particular forms, designs, and means of construction of them, are fo

various, but, for the most part, so well known, that it is unnecessary to give any description of them in this place. Those of the more ornamental kind should, however, in general, be contrived somewhat in conformity to the style of the ground, garden, place, and proprietor; being furnished from designs of great diversity and number, as well as of various degrees of elegance, from that of the simple bower of honeysuckle, hop, or vine, twined upon bent poles, to the Grecian porch or temple of the finest sort of masonry. Great caution is, however, required in the introduction of these sorts of ornamental erections into gardens of the culinary kind. And in them, as with every thing else which relates to them, use, Mr. Loudon supposes, should be the prevailing idea; and that, as *use* and *beauty* go hand in hand, the most vulgar objects may be dignified by the judicious introduction of elegance. A garden of the kitchen kind, though unmixed with productions purely ornamental, is still, it is thought, a pleasing scene, because full of *utility* and *animation*, and constantly varying from the practice of cultivation, as well as from the seasons. It is consequently very generally resorted to at most times of the year, but especially in the early spring months. Of course, in a climate so very variable as this, wherever the walks are frequently made use of at such a season, there should, it is said, be covered retreats or places for retiring to, which should correspond with the whole of which they are conspicuous parts or portions. In this way they may constantly be made to harmonize with the different objects around them.

RETREAT, in *War*, the retiring or moving back again of an army, or part of it.

We say, to sound a retreat, to secure a retreat, &c.

What they call a retreat in the armies, is really a flight; only a slight made by design, and with conduct.

The skill and ability of the general is known by his retreats more than his engagements. The retreat of the ten thousand Greeks under the command of Xenophon, has been admired in all antiquity.

The three most celebrated retreats of modern times have been general Moreau's retreat in 1796, that of Prague, and that of general Macdonald in Italy.

RETREAT, *Chequered, Rétraite en échiquier*, Fr. is so called from the several component parts of a line or battalion, which alternately retreat and face in the presence of an enemy, exhibiting the figures of the chequered squares upon a chess-board. In the "General Rules and Regulations," (part 4.) it is judiciously observed, that all manœuvres of a corps retiring, are infinitely more difficult to be performed with order, than those in advancing. They must be more or less accomplished by chequered movements; one body by its numbers or position, facing and protecting the retreat of another; and if the enemy presses hard, the whole must probably front in time and await him; as the ground narrows or favours, different parts of the corps must double; mouths of defiles and advantageous posts must be possessed; by degrees the different bodies must diminish their fronts, and throw themselves into column of march when it can be done with safety.

The chequered retreat by the alternate battalions or half battalions of a line going to the rear, while the others remain halted, cover them, and in their turn retire in the same manner, is the quickest mode of refusing a part of a corps to the enemy, and at the same time protecting its movement, as long as it continues to be made nearly parallel to the first position.

In the chequered retreat the following rules must be observed: The battalions of the division nearest to the enemy,

will form flanks as soon as there is nothing in their front to cover them; but the other divisions will not have any flanks except to the outward battalion of each. The battalions always pass by their proper intervals, and it is a rule in retiring, that the left of each shall always pass the right of the neighbouring one. Whatever advantages the ground offers, those advantages must be seized, without too critical an observance of intervals, or minute adherence to the determined distance of each retreat. The division next the enemy must pass in front, through the intervals of the division immediately behind, and any battalion, that finds it necessary, must incline for that purpose. The retiring division must step out, and take up no more time than what is absolutely required to avoid confusion. The division nearest the enemy fires by platoons standing; the flanks of its battalions only fire when the enemy attempts to push through the intervals. When that division retires, it fires on, skirmishes by men detached from its light company, if present, or from platoons formed of rear rank men of one or two of the companies, and placed behind the flanks of the battalions. But should any of its battalions be obliged to halt and to fire, a shorter step must then be taken by the line; and should the enemy threaten to enter at any of its intervals, besides the fire of its flanks, such platoons of the line behind it, as can with safety, must give it support.

RETREAT is a beat of the drum in the evening, at the firing of a piece called the evening-gun, at which the drum-major, with all the drums of the battalion, except such as are upon duty, beat round the regiment; the drums of the quarter-guards, of the general-guards, and all other small-guards, do likewise beat; the trumpets at the same time sounding at the head of their respective troops. This is to warn the soldiers to forbear firing, and the sentinels to challenge, till break of day, that the reveille is beat.

The retreat is likewise called *setting the watch*.

In fortified places, this is a signal for the inhabitants to come in before the gates are shut. See DRUM.

RETREAT, or *Relay*, in *Masonry*, denotes a little recess or diminution of the thickness of a wall, rampart, &c. in proportion as it is raised.

The retreat is properly the diminution of a wall, without side, or the contraction of its upper courses more than the foundation. Where the foundation is very large, they usually make two or three retreats. Parapets are always built with retreats.

RETRENCHMENT, in a general sense, literally signifies the cutting off or taking from a thing: in which sense it coincides with subtraction, diminution, &c.

The word is French, *retrenchment*, formed of *re*, and *trencher*, to cut.

RETRENCHMENT, in *Architecture*, *Carpentry*, &c. is used not only for what is cut off from a piece when too large, in order to a better proportioning it, or some other convenience, but also for the projections taken out of streets, public ways, &c. to render them more even, and in a line.

RETRENCHMENT, in *War*, denotes any kind of work cast up to strengthen or defend a post against the enemy.

Such are ditches with parapets, gabions, fascines, &c. for a covering, &c.

The enemy came with design to oblige them to raise the siege; but could not force the retrenchments.

Retrenchments are either *general* or *particular*.

General retrenchments are a kind of new defence made in a place besieged, to cover the defendants, when the enemy becomes master of a lodgement on the fortification, that they may be in a condition of disputing the ground inch by inch, and of putting a stop to the enemy's progress, in ex-

pectation of relief; as, if the besiegers attack a tenaille of the place, which they judge the weakest, either by its being ill flanked, or commanded by some neighbouring ground; then the besieged make a great retrenchment, including all that part which they judge in most danger. These should be fortified with bastions and demi-bastions, surrounded by a good ditch countermined, and higher than the works of the place, that they may command the old works, and put the besiegers to infinite trouble in covering themselves.

Particular retrenchments, or retrenchments within a bastion, (*retranchemens dans un bastion*, Fr.) must reach from one flank to another, or from one casemate to another. It is only in full bastions that retrenchments can be thrown up to advantage. In empty bastions you can only have recourse to retrades, or temporary barricades above the ramparts. The assailants may easily carry them by means of hand grenades, for these retrenchments never flank each other. It is necessary to raise a parapet, about five or six feet thick, before every retrenchment. It must be five feet high, and the ditches as broad and as deep as they can be made. There must also be small mines run out in various directions, for the purpose of blowing up the assailants, should they attempt to force the retrenchments.

RETRENCHMENT is more particularly used for a simple retrade made on a horn-work or bastion, when it is intended to dispute the ground inch by inch. See RETRADE.

It is usually a re-entering angle, whose faces flank each other; and is fortified with ditches, parapets, gabions, &c.

RETRIBUTION, RETRIBUTIO, a handsome present, gratuity, or acknowledgment, given in lieu of a formal salary or hire, to persons employed in affairs that do not so immediately fall under estimation, nor within the ordinary commerce in money.

Those who ministered at the altar anciently lived on retributions, which they received for the services they did the church. But these retributions were afterwards judged proper to be fixed to precise sums.

RETRIEVE, RETROUVER, to recover, get again, or repair a thing lost or damaged.

To retrieve, in *Falconry*, signifies to bring or find partridges again, which have been once sprung before.

RETROACTIVE, compounded of *retro*, backwards, and *ago*, I at, in *Law*, that which has an influence or effect on time past.

New laws and statutes, we say, have no retroactive effect; that is, they have no force or effect as to what is already passed; nor can be alleged as rules for any thing done before their promulgation. Their authority is wholly as to what is to come.

Indeed we have some instances of laws that have a retrospect to retroaction, *i. e.* are made with express design to extend to things already past. These we usually call laws *ex post facto*.

RETROCESSION, RETROCESSION, the act of going backwards, more usually expressed by *retrogression*, or *retrogradation*.

RETROCESSION of the *Equinox*. See PRECESSION.

RETROCESSION of *Curves*, &c. See RETROGRADATION.

RETROGRADATION, or RETROGRESSION, the act or effect of a thing moving backwards.

RETROGRADATION, in *Astronomy*, is an apparent motion of the planets, in which they seem to go backwards in the ecliptic, and to move contrary to the order or succession of the signs.

When a planet moves in *consequentia*, *i. e.* towards the following signs, or according to the order of the signs, as from

Aries to Taurus, from Taurus to Gemini, &c. that is, from west to east, it is said to be direct.

When it appears for some days in the same point of the heavens, it is said to be *stationary*.

And when it goes in *antecedentia*, i. e. towards the antecedent signs, or contrary to the order of the signs, viz. from east to west; it is said to be *retrograde*.

The sun and moon always appear direct. Herschel, Saturn, Jupiter, Mars, Venus, and Mercury, sometimes direct, sometimes stationary, sometimes retrograde.

The superior planets are retrograde about their opposition with the sun; the inferior ones about their conjunction. The intervals of time between two retrogradations of the several planets are unequal.

These changes of the courses and motions of the planets are not real, but only apparent: when viewed from the centre of the system, i. e. from the sun, they appear always uniform and regular. The inequalities arise from the motion and position of the earth from which they are viewed, and are thus accounted for:

Suppose PNO (*Plate XIX. Astronomy, fig. 12.*) a portion of the zodiac, ABCD the earth's orbit, and EMGHZ the orbit of a superior planet, e. gr. Saturn; and suppose the earth in A, and Saturn in E, in which case he will appear in the zodiac at the point O. If now Saturn remained without any motion, when the earth arrives at B, he will be seen in the point of the zodiac L, and would appear to have described the arc OL, and to have moved according to the order of the signs from west to east. But because, while the earth is passing from A to B, Saturn likewise moves from E to M, where he is seen in conjunction with the sun, he will appear to have described the arc OQ greater than that OL. In this state the planet is direct, and its motion is from west to east, or according to the order of the signs. And its motion, now that it is in conjunction with the sun, and most remote from us, is quicker than at any other time.

The earth arriving in C, while Saturn describes the arc MG, he will be observed in the zodiac at R. But the earth being advanced to K, and Saturn to H, so that the line KH, joining the earth and Saturn, be for some time parallel to itself, or nearly so, Saturn will be seen all that time in the same point of the zodiac at P, and with the same fixed stars; and is therefore at this time stationary.

But the earth being come to D, and Saturn arrived in opposition to the sun in Z, he will appear in the zodiac in V, and will seem to have been retrograde, or to have gone backwards through the arc PV. Thus the superior planets, on optical considerations, are always retrograde, when in opposition to the sun.

The arc which the planet describes while thus retrograde, is called the *arc of retrogradation*.

The arcs of retrogradation of the several planets are not equal. That of Saturn is greater than that of Jupiter; that of Jupiter than that of Mars, &c.

RETROGRADATION of the Nodes, is a motion of the line of the nodes, by which it continually shifts its situation from east to west, contrary to the order of the signs; completing its retrograde circulation in the compass of about nineteen years: after which time, either of the nodes, having receded from any point of the ecliptic, returns to the same again. See NODES.

RETROGRADATION of the Sun. When the sun is in the torrid zone, and has his declination AM (*Plate XIX. Astronomy, fig. 13.*) greater than the latitude of the place AZ, but either northern or southern as that is, the sun will appear to go backwards, or to be retrograde both before

and after noon. This can never happen, without the tropics, in a natural way.

For, draw the vertical circle ZGN to be a tangent to the sun's diurnal circle in G, and another ZON through the sun's rising, in O, it is evident all the intermediate vertical circles cut the sun's diurnal circle twice; first, in the arc GO, and the second time in the arc GI. Wherefore, as the sun ascends through the arc GO, it continually arrives at farther and farther verticals. But as it continues its ascent through the arc GI, it returns to its former verticals; and, therefore, is seen retrograde for some time before noon. The same it may be shown, after the same manner, it does for some time after noon. Hence, as the shadow always tends the opposite way to that of the sun, the shadow will be retrograde twice every day in all places of the torrid zone, where the sun's declination exceeds the latitude.

RETROGRADATION, or *Retrogression*, in the *Higher Geometry*, is the same with what we otherwise call *contrary flexion*. See FLEXURE and INFLEXION.

The general rule given by the marquis de l'Hôpital, for finding the point of reflection in curves whose ordinates are parallel, is the same as that for finding the point of contrary flexure, and consists in taking the second fluxion of the ordinate of the curve, and supposing it nothing or infinite: but this rule admits of many exceptions. See Maclaurin's Flux. b. i. c. 9. and b. ii. c. 5.

RETROGRADE, RETROGRADUS, formed from *retro*, backwards, and *gradior*, I go, something that goes backwards, or in a direction contrary to the natural one.

If the eye and the object both move the same way, but the eye much faster than the object, the object will appear to be retrograde, i. e. to go back, or to advance the contrary way from what it really does.

Hence it is that the planets, in some parts of their orbits, appear to be retrograde.

RETROGRADE order, in matters of numeration, is when, in lieu of accounting 1, 2, 3, 4, we count 4, 3, 2, 1.

RETROGRADE Verses are such as give the same words, whether read backwards or forwards: called also *reciprocal verses*, and *recurrents*. Such is

“Signa te signa; temere me tangis et angis.”

RETROGRADO, Ital. in *Music*, a retrograde motion of a melody, or subject of canon. This motion is sometimes termed by the Italians, *imitatione cancherizante*; imitation of the movement of a crab-fish. See CANON.

RETROGRESSION, or RETROCESSION, the same with retrogradation.

RETROMINGENTS, compounded of *retro*, backwards, and *mingo*, I make swater, in *Natural History*, a class or division of animals, whose characteristic is, that they stave backwards, both males and females. Such are lions, cats, &c.

RETROPANNAGIUM, RETROPANNAGE, in our *Ancient Law Books*, after-pannage; or what is left when the beasts have done, or eaten the best. See PANNAGE.

“Et debent habere retropannagium a festo Sancti Martini usque ad festum Pur. Beatæ Mariæ.” Petit. in Parl. temp. Edw. III.

RETROSPECT, a look or view backwards. See RETROACTIVE.

RETROVERSIO UTERI, in *Surgery*. The womb is subject to two particular changes in the position of its fundus, which may be displaced either forwards or backwards. The first case, sometimes termed *anteversion*, is the least frequent; the second, or *retroversion*, is more often met with. In the instance of anteversion, when the surgeon makes an

RETROVERSI O UTERI.

examination with his finger, he finds the fundus of the uterus inclining forwards towards the os pubis over the fundus of the bladder; while the os tincæ is carried backwards towards the sacrum, upon the middle of the rectum, sometimes so high up that it can hardly be reached with the finger. The patient has generally a constant inclination to make water; pressure just above the pubes always gives her considerable pain; whenever she gets up to walk, she is conscious of a hard substance falling upon the bladder, and obliging her to empty it; and, when she lies down upon her back, she feels the same hard body slip back again. In one example, a patient had such pain in the abdomen and soft parts, that she could scarcely move.

In general, the anteversion of the womb may easily be remedied. The patient being laid upon her back, which is to be somewhat raised up, the surgeon is to apply his hand above the pubes, and make pressure there, by which means the fundus uteri will be forced backwards, and the os tincæ inclined forwards into its natural situation. A recurrence of the displacement is to be prevented by the application of a pessary, which will support the os tincæ. The patient is to be kept for a certain time upon her back in bed, and a tight bandage should always be put round the body just over the os pubis. The uterus by degrees commonly becomes fixed again in its right position, so that the use of the pessary can be discontinued. The instrument must not be left off too soon, however, lest a relapse should be the consequence.

In the retroversion, the position of the womb is altered in a manner precisely the reverse of what occurs in the foregoing case. The os tincæ lies towards the pubes; while the fundus uteri is carried towards the sacrum, and is generally sunk so far down betwixt the vagina and the rectum, as to occasion, at the posterior part of the former canal, a protuberance, which closes it, and which at the same time compresses the rectum in such a manner, that the patient cannot void her feces, nor can clysters be administered. As in this preternatural position of the uterus, the bladder and meatus urinarius are unavoidably displaced, the case is always complicated with a retention of urine, which is the more afflicting, as it is usually very difficult, and even impracticable, to introduce a catheter. The opening of the meatus urinarius is sometimes drawn so high up, that it is actually higher than the pubes. Hence, the anterior parietes of the vagina are constantly very much stretched. When the retention of urine has lasted a certain time, the os tincæ above the pubes cannot be reached nor touched with the end of the finger. In this circumstance the bladder forms, beneath the os tincæ, a large swelling, which hinders the finger from feeling the latter opening. The patient always suffers excessive pain, which not unfrequently resembles that of labour, and arises partly from the impediment to the evacuation of the urine, and partly from the displaced condition of the parts. The disorder, therefore, has often been misunderstood, the patient's sufferings being regarded as labour-pains, and delivery expected. Indeed, when the complaint is not speedily removed, a miscarriage is the consequence. The case is frequently attended with fever and inflammation.

The retroversion of the uterus has never been observed, except in pregnancy, and always in the second, third, or fourth month of that state. It is most apt to occur in such women as have a wide pelvis. Fat subjects are more liable to the disorder than thin. It is observed to be brought on by bodily exercises and exertions, as, for instance, by violent vomiting, falls, the lifting of heavy burdens, &c. But, Richter thinks it unlikely, that the case should arise and be

suddenly produced by these causes alone. How, he asks, could the gravid, round, distended uterus be thus suddenly displaced, and become depressed betwixt the rectum and the vagina? He conceives it probable, that a predisposition to disorder, or rather an incipient stage of it, must have existed. He thinks it likely, that the occurrence of the complaint may be promoted by repeatedly neglecting to make water, and by the consequent distention of the bladder, whereby not only the fundus uteri is pressed towards the sacrum, but also the cervix becomes drawn upwards. Richter believes, that a small degree of retroversion, that has existed a good while, may only be increased by the causes already hinted at, so as to excite notice; and that the fundus of the uterus may now soon be forced by the efforts, resembling those of labour, so far down between the vagina and the rectum, that all these parts become as it were adherent together. The foregoing statement Richter thinks the more likely to be correct, inasmuch as cases have actually been observed, where patients have experienced various slight complaints a considerable time before the retroversion was known to exist; but which complaints might be ascribed to the incipient stage of that sort of displacement of the uterus. How it happens, that retroversion of this organ is only met with in the early months of pregnancy, is easy of comprehension. The retroversion is promoted by the weight of the gravid uterus. During the latter half of the period of gestation, however, the uterus is too large to be capable of descending betwixt the vagina and rectum; and the occurrence of retroversion, except in pregnancy, is what can hardly be conceived.

The surgeon should always endeavour to put the retroverted uterus, as soon as possible, into its natural position again. The longer the retroversion has lasted, the more difficult it is of removal, and the more pressing are the dangers, of which there is cause for apprehension. The most urgent peril arises from the retention of the urine, and the stoppage of evacuations from the bowels. The longer these functions are obstructed, and the more the urine and feces accumulate, the more violent do the painful labour-like efforts become, whereby the fundus uteri is continually pressed more and more deeply downwards. Besides, the distention of the rectum and bladder operates itself as an immediate impediment to the reduction of the uterus. Patients have been known to lose their lives in consequence of the bladder giving way. Sometimes abortion happens; and very often the consequences of such an event are favourable; the urine soon afterwards being spontaneously voided, and all the complaints subsiding. (Saxtorph, *Collectanea Havnienfia*, vol. ii.) The disorder, however, has been known to continue eleven days, and yet admit of being removed in the most favourable manner.

In difficult cases, the reduction of a retroverted uterus may be facilitated by previously emptying the rectum and bladder; an object which is frequently practicable. The distended bladder not only renders the reduction difficult, but is attended with some danger of that organ bursting in the operation, which often requires the exertion of considerable force, especially when the bladder is very much dilated. Hence, before attempting the reduction, the surgeon is called upon always to endeavour to draw off the urine. When the bladder has been emptied, the retroverted uterus sometimes spontaneously returns into its natural position, as several cases on record have proved. (Hunter and Chelton in *Medical Communications*, vol. ii.; Croft in *London Medical Journal*, vol. xi.) Such facts must fully convince us, how much the reduction may be facilitated by drawing off the urine in the first instance. A catheter may frequently

frequently be introduced; but it should be of the flexible sort. A curved inflexible one will also sometimes pass, if care be taken to keep its concavity turned towards the vagina. Rotating the catheter on its axis is here a particularly useful plan. When the catheter cannot be passed, other means will sometimes answer for bringing about an evacuation of the urine. In some cases, the water will begin to flow out, when two fingers are introduced betwixt the pubes and os tincæ, and the latter part is pressed towards the sacrum. Sometimes pressing the os tincæ downwards with the finger; on other occasions, raising the fundus uteri backwards and upwards, by means of two fingers in the vagina will have the desired effect.

When the bladder cannot be emptied in this manner, nor by the catheter, and should it be very much distended, and the reduction of the uterus attended with great difficulty, there can be no doubt about the necessity of puncturing the bladder; for the immediate and most urgent danger arises from the retention of urine, and, probably, the distended bladder is itself the chief impediment to the reduction of the womb into its natural position. To these considerations we may add, that the paracentesis of the bladder has been performed in these cases with complete success. (Cheston in Medical Communications, vol. ii.) The practitioner must also endeavour to empty the rectum by means of clysters, though, it must be confessed, their application is always attended with a degree of difficulty.

The reduction of the retroverted uterus is executed by pressing with two fingers applied to the fundus of this viscus. A principal obstacle to the success of the attempt is caused by the projection of the os sacrum. Hence, it is an indication of the greatest consequence to remove the fundus of a retroverted uterus as far as possible from that bone, in order that the preceding sort of hindrance to the reduction may be avoided. With this view the pressure of the fingers should be so directed as not to incline towards the prominence of the sacrum. During the operation, the patient should rest upon her elbows and knees, as, in this position, the uterus will be at a greater distance from the sacrum. Richter disapproves of the plan, which some writers have recommended, and which consists in introducing two fingers into the vagina, for the purpose of reaching and drawing downwards the os tincæ. He asserts, that such part can seldom be reached, and, that if it could be so in a few instances, it would not admit of being drawn downwards, while the fundus is incapable of following in the same direction. Richter also observes, that the fundus uteri is at this period the less likely to be reduced, because the fingers in the vagina have the effect of pressing it towards the projection of the sacrum.

The pressure of the finger, whereby the fundus uteri is to be pushed up, should be directed forwards and upwards towards the navel. When the pressure is made directly upwards, the body of the uterus is forced against the projection of the sacrum, and the attempt cannot possibly succeed. Indeed, when much force is exerted, as is sometimes requisite, pressure thus directed may do injury to the fœtus and the mother, and bring on abortion. It is advantageous to introduce two fingers into the rectum, with their backs towards the sacrum, and their insides towards the vagina; for they may then be used for keeping the uterus towards the navel. Perhaps it may likewise be advisable to lay two fingers on the abdomen above the pubes, in order to prevent the os tincæ from inclining upwards. Perhaps, also, two fingers, passed into the vagina, might be usefully employed in pressing the fundus uteri upwards. In difficult cases, this double kind of pressure might be absolutely necessary. If

the retroverted uterus should not yield to the foregoing practice, an endeavour may be made, at all events, to push the displaced viscus upwards on one side of the projection of the sacrum.

In certain examples, it may be proper not to pass the fingers into the rectum, but merely into the vagina; 1st, because we can thus more certainly and effectually make the pressure act upon the uterus; and 2dly, because, when the posterior parietes of the vagina are pushed with the end of the fingers towards the sacrum, and the upper part of this tube, situated betwixt the fingers and the os tincæ, is stretched, the vagina acts upon the uterus in a manner particularly well calculated to promote the reduction. Not more than two fingers, however, ought to be introduced, as more have the effect of dilating the vagina laterally, and preventing it from becoming tense in the longitudinal direction. Theden's Bemerkungen, 3 Sheil.

When this method is adopted, the uterus in general begins to yield at first slowly, and afterwards it suddenly returns into its natural situation. Sometimes the tendency to retroversion is so great, that the disorder recurs almost immediately after the reduction has been accomplished. In this circumstance, the patient must wear a pessary, until all hazard of another retroversion is removed by the increase of pregnancy. (Hunter in Medical Observations and Enquiries, vol. iv.) Sometimes, when the bladder has been very much distended with urine during the continuance of a retroversion of the womb, a retention of urine from weakness of the bladder will remain after the reduction of the uterus, and demand the use of the catheter. Richter's Anfangsgrunde der Wundarzneykunst; Hunter in Medical Observations and Enquiries, vol. iv.; Cheston, in Medical Communications, &c.

RETSCHITZ KARDASCH, in *Geography*, a town of Bohemia, in the circle of Bechin; 15 miles S.W. of Tabor.

RETSCHITZ Rot, a town of Bohemia, in the circle of Bechin; five miles N. of Pilgram.

RETTEN, a town of the duchy of Stiria; 12 miles W. of Friedburg.

RETTERRHEIM, a town of the duchy of Wurzburg, insulated in Wertheim; 16 miles W. of Wurzburg.

RETTERSBACH, a town of the duchy of Wurzburg; five miles S. of Gemunden.

RETTERSWALD, a town of Prussia, in Pomerelia; seven miles S.E. of Marienburg.

RETTINGBERS, a town of Hindoostan, in Mysore; 38 miles E. of Chitteldroog. N. lat. 14° 5'. E. long. 77° 4'.

RETTLSTEIN, a town of Stiria, on the Muehr; six miles S.E. of Pruck.—Also, a mountain of Stiria; eight miles E. of Pruck.

RETTO, Ital. in *Music*, straight forward, direct, one of the three movements of musical notes or sounds in melody; which are, *moio retto*, *moio contrario*, and *moio obliquo*. *Moto retto* is, therefore, a regular ascent of the scale, or a part of it; as moving from the key-note to the 5th through all the intermediate sounds, in regular order; as c d e f g, &c. Another species of movement seems wanting to express wide intervals, such as skips or leaps beyond the regular progression, which in Latin is expressed by the words *per saltum*, and in Italian either is, or might be, called *moto de salto*.

RETUERTO, in *Geography*, a town of Spain, in Old Castile; 18 miles S. of Burgos.

RETURN, RETURNA, or *Retorna*, in *Law*, hath divers acceptations. As,

RETURN of *Writs* by sheriffs and bailiffs, is a certificate made to the court by the sheriff, bailiff, &c. of what is done with regard to the execution of the writ directed to them.

Whence the day, on which the defendant is ordered to appear in court, and on which the sheriff is to bring in the writ, and report how far he has obeyed it, is called the return of the writ; it being then returned by him to the king's justices at Westminster. And it is always made returnable at the distance of at least fifteen days from the date or teste, that the defendant may have time to come up to Westminster, even from the most remote parts of the kingdom; and upon some day in one of the four terms, in which the court sits for the dispatch of business. See RETURNS, *infra*.

Such also is the *return of a commission*, which is a certificate, or answer of what is done by the commissioners to whom such commissions, precepts, mandates, or the like, are directed,

RETURN is also used in case of a replevin. If a man distrain cattle for rent, &c. and afterwards justify or avow his act, so as it is found lawful, the cattle before delivered unto him that was distrained, upon security given to prosecute the action, shall now be returned to him that distrained them. See RETURNO *Habendo*, and REPLEVY.

RETURN of *Members of Parliament*. See PARLIAMENT.

RETURN to a *Mandamus*. See MANDAMUS.

RETURNS, *Return-days*, or *days in bank, dies in banco*, that is, days of appearance in the court of common pleas, usually called *bancum*, or *commune bancum*, to distinguish it from *bancum regis*, or the court of king's bench, are certain days in each term peculiarly set apart for the several kinds of proceedings in any cause to be determined. These days are generally at the distance of about a week from each other, and regulated by some festival of the church. On some one of these days in bank all original writs must be made returnable, and therefore they are commonly called the returns of that term; of which every term has more or less, said by the MIRROR (cap. 5. § 108.) to have been originally fixed by king Alfred, but certainly settled as early as the statute of 51 Hen. III. stat. 2. But though many of the return-days are fixed upon Sundays, yet the court never sits to receive these returns till the Monday after; and, therefore, no proceedings can be had, or judgment can be given, or supposed to be given on a Sunday. See DAY.

Hilary term has four such returns; *viz. octabis Hilarii*, eight days after Hilary day; *quindena Hilarii*, fifteen days; *crastina Purificatione*, the day after the Purification; and *octabis Purificationis*, eight days after, inclusive.

Easter term has five returns; *viz. quindena Pasche*, fifteen days after Easter; *tres Pasche*, three weeks after; *mensis Pasche*, the day month after Easter; *quinque Pasche*, the day five weeks from Easter; and *crastino Ascensionis Domini*, the day after Ascension-day.

Trinity term has four returns; *viz. crastino Trinitatis*, the day after Trinity; *octabis Trinitatis*, eight days after, inclusive; *quindena Trinitatis*, fifteen days after; and *tres Trinitatis*, three weeks after.

Michaelmas term has four returns, by stat. 24 Geo. II. cap. 48. *viz. crastino Animarum*, morrow of All-Souls; *crastino Martini*, the morrow of St. Martin; *octabis Martini*, eight days after, inclusive; and *quindena Martini*, fifteen days after.

The first return in every term is, properly speaking, the first day in that term; *e. gr.* the octave of St. Hilary, which

falling on the thirteenth of January, the octave, or first day of Hilary term, is the twentieth of January; and this is called the *essoign day of term*. But by reason of the *quarto die post*, the court does not sit, at the beginning of each term, for dispatch of business, till the fourth day, as in Hilary term on the twenty-third of January; and in Trinity term, by statute 32 Hen. VIII. cap. 21. not till the sixth day; which is, therefore, usually called and set down in the almanacs as the first day of *Term*; which see.

RETURN, in the *Military Language*, denotes the list of the sick, given in once a week by the surgeon to the commanding officer of a regiment.

Commissioned officers are not put in the returns, which, on that account, are but an imperfect list of the sick.

Twelve sick, in a battalion of 780 private men, is the lowest return that can be expected, even in the most healthy season and climate, as well as best quarters. Returns are often much higher, but seldom exceed seventy in a battalion.

It is to be observed, that returns include all accidents unfitting a soldier for duty; together with a general state of the army, regiment, or company. See Pringle's Observ. on the Diseases of the Army, p. 12—36.

In section V. of the articles of war, it is expressed, that every officer who shall knowingly make a false return to the king, to the commander-in-chief of the forces, or to any his superior officer authorized to call for such returns, shall, upon being convicted thereof before a general court-martial, be cashiered.

Whoever shall be convicted of having designedly, or through neglect, omitted sending such returns, shall be punished according to the nature of the offence by the judgment of a general court-martial.

Returns are to be made in the same manner of the forces in Ireland to the chief governor or governors thereof; likewise of the forces in North Britain to the officer there commanding in chief: which returns are from time to time to be transmitted to England as it shall appear best for the service.

Exact returns from Gibraltar, &c. and regiments stationed abroad, are by their respective governor or commanders *there residing*, by all convenient opportunities to be transmitted to the secretary at war, in order that the same may be laid before the king.

The life and foot-guards do not make any returns to the commander-in-chief or secretary at war, but to the king direct through their several field officers. This privilege is attached to them upon the principle of being household troops. Upon the same principle they have always, when brigaded, a general of their own attached to each brigade; on which account likewise, no other military honours than those done to their own brigade general are to be paid by them, except to a branch of the royal family, or to a commander-in-chief.

RETURN, *To*, in a military sense, to insert the names of such officers, &c. as are present or absent on the stated periods for the identification of their being with their regiments, on detachment, or absent with or without leave.

Every officer commanding a regiment or detachment, will, on his arrival from abroad, transmit to the adjutant-general's office, and to the war-office, a disembarkation return, a duplicate of which he will also deliver to the general, or other officer commanding at the port at which he disembarks.

Commanding officers of regiments in South Britain, are regularly to transmit to the adjutant-general's office the following returns.

A monthly, on the 1st of each month.

A return

A return of officers, on the 14th of each month.

A weekly state, to arrive on Mondays.

To the war-office.

A monthly return, on the 1st of each month.

A return of absent officers, on the 14th of each month.

Every officer commanding a regiment, or detachment, on embarking for a foreign station, will transmit an embarkation return to the adjutant-general's office, and to the war-office, a duplicate of which he will deliver to the general or officer commanding at the port from which he embarks.

On a regiment embarking, the commanding officer is to transmit to the adjutant-general's office, a return of the recruiting parties he purposes to leave in Great Britain, or Ireland, specifying their strength, their stations, and the officers by whom they are commanded; a duplicate of this return is to be transmitted to the inspector-general of the recruiting service in the Isle of Wight.

All officers belonging to regiments on foreign stations, not actually employed on the recruiting service, are to report their arrival from abroad, and the cause of their absence, at the adjutant-general's office, and are to leave their addresses with their respective agents, and in case of their changing their places of residence, are immediately to notice the same to their agent: any officer whose address is not with his agent, will be considered as absent without leave, and guilty of disobedience of orders.

Officers upon half pay are, in like manner, to leave their addresses at the war-office; particularly so if they should leave the united kingdoms; and officers belonging to the militia are to leave their names, &c. with the several adjutants of regiments.

Commanding officers of regiments are to transmit to the quarter-master-general an half-yearly return of quarters, on the 1st of December, and the 1st of May, agreeable to the printed form; likewise a report of any march performed by the corps under their orders.

All returns, reports, and papers, purely of a military and public nature, which are to be sent to the adjutant-general, are to be addressed, "To the Adjutant-general of the Forces, Horse-guards, London," without adjoining his name.

All official letters from general or other officers in command, which are designed to be laid before his royal highness the commander-in-chief, are to be signed by the general or commanding officers themselves.

All official letters, intended for the deputy adjutant-general, or other officers belonging to the department, are to be transmitted, under covers, addressed as above, to the adjutant-general.

To prevent an improper expence of postage, all official letters and returns sent to the quarter-master-general, or officers in his department, are to be sent, under covers, addressed "To the right honourable the Secretary at War, London;" and on the outside of the covers is to be written, in legible characters, "Quarter-master General's Department."

RETURN, in *Building*, denotes a side, or part, that falls away from the fore-side of any straight work.

RETURNS of a *Trench*, in *Fortification*, are the turnings and windings which form the lines of a trench.

RETURNS of a *Mine*, in the *Military Art*, are the turnings and windings of the gallery.

RETURNED next for *Purchase*. When vacancies occur in regiments upon foreign or domestic stations, the names of such officers as intend to purchase must be inserted in the muster rolls; they are then said to be returned next for

purchase. This serves as a government to the several agents, and prevents the introduction of persons into a corps they have not done duty with, to the disparagement of those who have always followed the colours. The present commander-in-chief is particularly scrupulous on this head. Every officer that is returned next for purchase, must take care to apprise his agent that the money will be lodged for that purpose.

RETURNING STROKE, in *Electricity*, is an expression used by lord Mahon, (now earl Stanhope,) to denote the effect produced by the return of the electric fire into a body from which, in certain circumstances, it has been expelled.

In order to understand the meaning of these terms, it is necessary to premise that, according to the noble author's experiments, an insulated smooth body, immersed within the electrical atmosphere, but beyond the striking distance, of another body charged positively, is at the same time in a state of threefold electricity. The end next to the charged body acquires negative electricity; the farther end becomes positively electrified; while a certain part of the body, somewhere between its two extremities, is in a natural, unelectric, or neutral state; so that the two contrary electricities balance each other. Moreover, it may be added, that if the body be not insulated, or have a communication with the earth, the whole of it will be in a negative state; a certain portion of its natural quantity of electricity being driven into the common mass, by the pressure, repulsion, or other action of the electric matter belonging to the charged prime conductor. Let us then suppose a brass ball, which we may call A, to be constantly placed at the striking distance of a prime conductor; so that the conductor, the instant when it becomes fully charged, explodes into it. Let another large conductor, which we may call the second conductor, be suspended, in a perfectly insulated state, farther from the prime conductor than the striking distance, but within its electrical atmosphere: let a person standing on an insulated stool touch this second conductor very lightly with a finger of his right hand; while, with a finger of his left hand, he communicates with the earth, by touching very lightly a second brass ball fixed at the top of a metallic stand, on the floor, which we may call B; while the prime conductor is receiving its electricity, sparks pass (at least if the distance between the two conductors is not too great) from the second conductor to the insulated person's right hand; while similar and simultaneous sparks pass out from the finger of his left hand into the second metallic ball B, communicating with the earth. These sparks are part of the natural quantity of electric matter belonging to the second conductor, and to the insulated person, driven from them into the earth, through the ball B, and its stand, by the elastic pressure or action of the atmosphere of the prime conductor; the second conductor, and the insulated person, are hereby reduced to a negative state. At length, however, the prime conductor having acquired its full charge, suddenly strikes into the ball B, of the first metallic stand, placed for that purpose at the striking distance. The explosion being made, and the prime conductor suddenly robbed of its elastic atmosphere, its pressure or action on the second conductor, and on the insulated person, as suddenly ceases; and the latter instantly feels a smart returning stroke, though he has no direct or visible communication (except by the floor) either with the striking or struck body, and is placed at the distance of five or six feet from both of them. This returning stroke is evidently occasioned by the sudden re-entrance of the electric fire naturally belonging to his body and to the second conductor,

which

which had before been expelled from them, by the action of the charged prime conductor upon them, and which returns to its former place in the instant when that action or elastic pressure ceases. When the second conductor and the insulated person are placed in the densest part of the electrical atmosphere of the prime conductor, or just beyond the striking distance, the effects are still more considerable; the returning stroke being extremely severe and pungent, and appearing considerably sharper than even the main stroke itself, received directly from the prime conductor. Lord Mahon, in the application of this experiment, and of the doctrine deduced from it, observes, that persons and animals may be destroyed, and particular parts of buildings may be considerably damaged, by an electrical returning stroke, occasioned even by some very distant explosion from a thunder cloud; possibly at the distance of a mile or more. It is certainly easy to conceive (says a very ingenious anonymous writer, in his reflections on this subject) that a charged extensive thunder cloud must be productive of effects similar to those produced by the prime conductor. Like the conductor, while it continues charged, it will, by the superinduced elastic electrical pressure of its atmosphere, drive into the earth a part of the electrical fluid naturally belonging to the bodies which are within the reach of its widely extended atmosphere, and which will, therefore, become negatively electrical. This portion, too, of their electric fire will, on the explosion of the cloud at a distance, and the cessation of its action upon them, suddenly return to them, so as to produce an equilibrium, and restore them to their natural state. But the effects are not so great, nor the danger so terrible, as the noble author seems to apprehend. If the quantity of electric fluid naturally contained, *e. gr.* in the body of a man, were immense or indefinite, his lordship's estimate between the effects producible by a cloud, and those caused by a prime conductor, might be admitted; but surely an electrified cloud, how great soever may be its extent and the height of its charge, when compared with the extent and charge of a prime conductor, cannot expel from a man's body (or any other body) more than the natural quantity of electricity which it contains. On the sudden removal, therefore, of the pressure by which this natural quantity had been expelled in consequence of the explosion of the cloud into the earth, no more (at the utmost) than his whole natural stock of electricity can re-enter his body, provided he be so situated, that the returning fire of other bodies must necessarily pass through his body. But we have no reason to suppose that this quantity is so great, as that its sudden re-entrance into his body should destroy or even injure him.

In the experiment above described, the insulated person receives into his body, at the instant of the returning stroke, not only all that portion of his own natural electric fire which had been expelled from it, but likewise transmits through it, at the same instant, in consequence of his peculiar situation, all the electric fire of which the largest second conductor had been robbed, and which must necessarily repass through his body, to arrive at that conductor. To render the case somewhat parallel in natural electricity, the man's body must be so peculiarly circumstanced, supposing him to be in a house, that the electric matter which has been expelled from the house into the earth, by the pressure of an extensive thunder cloud, could not return back into the building, on the explosion of the cloud at a distance, without passing through his body: a case not likely to happen, unless the house were insulated (like the second conductor in the preceding experiment), and his body became the channel through which alone the house could have its electric

matter restored to it. It appears much more probable, that the electric matter returns to the house through the same channels by which it before insensibly passed out, and with equal silence, though more suddenly. In the case of a man who is abroad, and in an open field, during the time of an explosion; as he is unconnected with other masses of matter above him, no more than the precise quantity of electric fire, which had been before expelled from his body, will suddenly return into it at the instant of a distant explosion; and that this quantity is not very large, may be inferred from many considerations. Allowing, therefore, the existence of the returning stroke, as sufficiently ascertained, and well illustrated, in a variety of circumstances, by the author's experiments, the magnitude and danger of it are not so alarming as he apprehends. Lord Mahon's *Principles of Electricity*, &c. 4to. 1779, p. 76—113—131. *Monthly Review*, vol. lxii. p. 436—442.

RETURNO HABENDO, or *Returum averiorum*, in *Law*, a writ which lies for him who has avowed a distress made of cattle, and proved his distress to be lawfully taken; for the return of the cattle distrained unto him, which before were replevied by the party distrained, upon surety given to pursue the action.

The same writ is granted when the plaintiff or action is removed by *recordare* or *accedas ad curiam*, into the court of common pleas; and he whose cattle were distrained makes default, and does not prosecute his action. See REPLEVY.

RETURNUM AVERIORUM, a judicial writ, the same with *retorno habendo*.

RETURNUM *Irreplegiabile*, a judicial writ, sent out of the common pleas to the sheriff, for the final restitution or return of cattle to the owner, unjustly distrained damage feasant, and so found by the jury before justices of assize in the county, or otherwise through default of prosecution.

RETUSAVI, in *Geography*, a name formerly given to a small island of Russia, in the gulf of Finland, on which the town of Cronstadt stands, and now called the isle of Cronstadt; 20 miles W. of Petersburg. This is only remarkable for an excellent haven, strongly fortified, the chief station of the Russian fleet.

RETUSUM FOLIUM, in *Botany*, a retuse, or abrupt, leaf, terminates bluntly, with a broad shallow notch, as in *Rumex digynus*, or Mountain Sorrel. See LEAF.

RETWEYER, in *Geography*, a lake of Bavaria, in the bishopric of Bamberg; 6 miles N.E. of Vilseck.

RETZ, JOHN-FRANCIS-PAUL DE GONDI, *Cardinal de*, in *Biography*, a celebrated political character, was born at Montmirel in 1614. His father, who was general of the galleys, obliged him, against his inclination, to embrace the ecclesiastical profession. He passed through his course of study with distinction, and was made a doctor of the Sorbonne in 1643, in which year he was nominated coadjutor to the archbishop of Paris. In his conduct and character he set at defiance public opinion, and engaged in almost every species of debauchery: he fought several duels, and delighted in political intrigue. According to Voltaire, he was, at the age of twenty-three, eager in carrying on a conspiracy against the life of cardinal Richelieu. The ministry of Mazarin, however, was the period in which he most engaged as a partisan, and he engaged deeply in all the cabals which produced the petty civil war of the Fronde. He imposed upon the people by a feigned devotional seriousness in performing his prelatial functions, and affected the greatest zeal for the privileges of the clergy and the good of the public. He was among the most violent opposers of the court, and once took his seat in the parliament with a poniard in his pocket, the handle of which being seen, it was neatly observed

observed, "there is our archbishop's breviary." He boasted that he had a principal share in urging the Parisians to take up arms on the day of *barricades*. At length, however, he found that the interests of his ambition would be better served by making a secret accommodation with the court, and he was brought over by a cardinalate, to which he was nominated by the king in 1651. Like other deserters, he lost his popularity, and was able only to act a secondary part on the political stage. Continuing his cabals, Mazarin, who hated and dreaded him, procured his arrest at the Louvre, and caused him to be thrown into prison. From the dungeon he escaped, and went to Rome, where he was received with distinction as the enemy of Mazarin. He was present at the election of Alexander VII., but finding that pontiff cool to his interests, he left Italy, and passed some years in wandering through Holland, Flanders, and England. Wearied with a life of exile, he returned to France in 1661, after Mazarin's death, and made peace with his court by the renunciation of his archbishopric, to which he had succeeded at the death of his uncle, obtaining the abbacy of St. Denis by way of recompence. He had hitherto lived in great style, and had plunged himself deeply in debt, but he now resolved to live on a very limited income, till he had satisfied his creditors. This he completely effected, and lived to be in circumstances that allowed him the gratification of being liberal to his necessitous friends. In 1675 he sent back his cardinal's hat, intending to quit the world, but the pope refused to accept his resignation. His conduct in the latter part of his life obtained for him the esteem of men of worth: he died at Paris in 1679, at the age of 66. The character of cardinal de Retz has been drawn by almost all the French historians who have written since his time. By one he is described "as a person who, with the habit of a priest, displayed a disposition better suited to camps or courts; and licentious in manners and profligate in his morals, he acquired an ascendancy over the minds of the people, without condescending to throw a veil over his vices, or employing the popular pretext of religion." Another writer says, he was "daring, turbulent, false, intriguing, with designs rather romantic than great, and conducted rather with dexterity than ability: he seems to have been exactly fitted for the part which he sustained, of a political meteor in troublesome times, among a frivolous and licentious people." Voltaire, speaking of the memoirs of the cardinal, drawn up by himself, says, "they are written with an air of greatness, an impetuosity of genius, and an inequality, which are the image of his conduct. He composed them in his retreat, with the impartiality of a philosopher, but of one who had not always been a philosopher. He neither spares himself nor others." Other writings of cardinal de Retz have been published relative to the times and party.

RETZ, in *Geography*, a town of Bavaria; 26 miles N.N.E. of Ratisbon.

RETZBACH, a town of the duchy of Wurzburg; 4 miles S.S.E. of Carlstadt.

RETZIA, in *Botany*, an elegant Cape shrub, so named by professor Thunberg, in the Transactions of the Academy of Lund, in honour of his friend Andrew John Retzius, member of the Stockholm Academy, and of various other learned societies, Professor of Natural History at Lund. This distinguished botanist and worthy man is best known, out of his own country, by his folio volume of *Observationes Botanicae*; and his *Flora Scandinaviae Prodromus*, a systematic octavo work, in the Linnæan manner. He has, besides, published many essays and dissertations, relating to various branches of natural knowledge, both in Latin and Swedish,

and is still living.—Thunb. Act. Lund. v. 1. 55. Nov. Gen. 4. Linn. Suppl. 18. Schreb. 115. Willd. Sp. Pl. v. 1. 843. Mart. Mill. Dict. v. 4. Jul. 133. Lamarek Illustr. t. 103.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Convulvuli*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, tubular, in five rather deep, lanceolate, acute, unequal segments. Cor. of one petal, tubular, cylindrical, villous both within and without, terminating in five ovate, obtuse, concave, erect segments, very hairy at the summit. Stam. Filaments five, awl-shaped, inserted into the corolla, shorter than its limb; anthers arrow-shaped, compressed. Pisl. Germen superior, oblong; style thread-shaped, longer than the corolla; stigma in two small, linear, obtuse segments. Peric. Capsule oblong, acute, with two lateral furrows, two cells and two valves. Seeds several, minute.

Ess. Ch. Corolla of one petal, cylindrical, externally hairy. Stigma cloven. Capsule of two cells, with many small seeds.

1. *R. spicata*. "Thunb. Act. Lund. v. 1. 55. t. 1. f. 2." Linn. Suppl. 138. Willd. n. 1. (*R. capensis*; Thunb. Nov. Gen. 5.)—Native of high, dry, hilly situations, at the Cape of Good Hope. Gathered by Mr. Niven in Hottentot's Holland. The stem is shrubby, erect, from four to seven feet high, with round, knotty, hairy, leafy branches. Leaves densely imbricated, somewhat whorled, sessile, linear-lanceolate, rigid, acute, thick-edged, entire, two inches or more in length; hairy about the lower part. Flowers axillary, sessile, solitary, plentiful towards the ends of the branches, about as long as the leaves; villous and hoary externally; dark purple within.

The remark of Linnæus the younger, in the Supplement, respecting this genus, is very extraordinary. He says "it is no natural genus, but agrees so much with *Convulvulus*, in habit and character, as to differ in nothing except the tubular corolla, which is externally very hairy." Now in fact, its rigid shrubby habit is altogether that of a *Protea*, nor can any thing be less like a *Convulvulus*, even of the shrubby kind. The character of the corolla is also most distinct, being cylindrical, and wanting the five plaits, so essential to *Convulvulus*. It is true that the *Retzia* requires to be observed by some botanist conversant with natural orders, that we might have clearer ideas of its characters and affinities. The plant is a stranger in our gardens.—We have not had an opportunity of consulting the Lund Transactions, to determine whether the specific name is there *capensis* as Thunberg, or *spicata* as Linnæus, cites it. Both are highly exceptionable.

RETZSTADT, in *Geography*, a town of the duchy of Wurzburg; 5 miles S.S.E. of Carlstadt.

RETZTAT, OBER, or Upper, a river of Franconia, which rises near Weissemburg, passes by Oettingen, and joins the Unter Retztat, to form the Rednitz.

RETZTAT, Unter, a river of Franconia, which rises near Burg Bernheim, in the principality of Culmbach, and joins the Upper Retztat, three miles N.E. of Spalt, to form the Rednitz.

REVA, a town of Asiatic Turkey, in Natolia; 10 miles E. of Constantinople.

REUHLIN, JOHN, in *Biography*, a celebrated German philosopher, and assiduous contributor to the revival of learning in the 15th and 16th centuries, descended from a respectable family in Swabia, was born in the year 1454. He made a most rapid progress in school-learning, and when that was completed, he went to Paris with the young marquis of Baden, who had been his class-fellow at school. Here he pursued his studies under the most celebrated mas-

ters in Europe, and soon became well skilled in the Aristotelian philosophy. In this city, and in the diligent pursuit of learning, he remained till he was twenty years of age, when he went to Basil, where he was admitted a master in philosophy, and taught the Greek language to numerous pupils, with great reputation. Here he also prosecuted his study of the Hebrew, the elements of which he learnt while very young. At the same time, judging that the best manner of learning is by teaching, he drew up and published a grammar, a lexicon, and vocabulary, which at that period were highly esteemed, and thought to be of great use in instructing young people. Having spent four years at Basil, he went to Orleans for the purpose of studying jurisprudence, and he also taught the Greek language in that city. From this place he removed to Poitiers, where he was admitted to the degree of doctor. He next accompanied the count of Wittemberg in a tour through Italy, and was introduced at the court of Lorenzo de Medici, at Florence, and contracted an intimacy with Ficinus, Politian, Picus, and other illustrious Platonic philosophers, and was induced to embrace their opinions. In these opinions he was confirmed at Rome by the learned Hermolaus Barbarus, who, disliking the harshness of the German name Reuchlin, prevailed upon him to change it for one more musical, namely, *CARNIO*, signifying, like *Reuchlin*, *smoke*, and by this he was afterwards known among foreigners. He conducted himself with so much ability and address in his tour, that he was, after his return to Germany, deputed as ambassador from the count of Wittemberg, to the emperor Frederic III. at Vienna. During his residence at this court, he made further progress in the Hebrew language, under the instructions of one of the emperor's physicians, who was a Jew; and it was contrived by the Jew, that among the presents which, according to custom, he was to receive as ambassador, should be included a beautiful and ancient manuscript Hebrew bible, as a special compliment paid to him by the emperor, on account of his eminent literary attainments. Frederic dying in 1493, Reuchlin returned to the court of Wirtemberg, and was appointed to be the count's deputy to the diet of Worms, in which his prince was elevated to the ducal dignity. Scarcely had he enjoyed that honour three months, when he died, leaving his dominions to his nephew Ulric. The power of this prince was contested by another nephew, who assumed the title of Eberhard II., and who carried the point. One of the first acts of this prince was to banish Reuchlin for his attachment to the interests of prince Ulric. He now retired to Worms, and wrote "An Epitome of the History of the four Empires," for the use of the prince Palatine. He also wrote at this time two Latin comedies, abounding with wit and satire, which were afterwards published. In 1498, the elector Palatine, having been involved in a dispute with pope Alexander VI., fixed upon Reuchlin as the person best qualified to defend his cause, and sent him for that purpose to Rome in the capacity of his ambassador. On this occasion he pronounced an able and eloquent oration before the pope and cardinals, concerning the rights of princes, and the privileges of the churches in Germany, which was printed by Aldus. Before he returned to Germany, a revolution had taken place at Wirtemberg, the usurper having been expelled, and Ulric reinstated in his rights. Upon this change, Reuchlin was recalled to the ducal court by the guardians whom the emperor had appointed for Ulric, and very soon after he was nominated to the dignity of one of the triumvirs of the league of Swabia for the emperor and the electors. He was next sent ambassador to the emperor Maximilian; and upon his return, finding the plague raging in Swabia, he retired to Stutgard, where he was hospitably

received into a monastery of the Dominicans, and at their request, he drew up a work on the art of preaching. Towards the close of his life he encountered much trouble and danger from the resentment of the monks and other bigots of Cologne, occasioned by his opposition to their enthusiastic rage for the destruction of all Jewish books excepting the bible. It is not necessary to enter at large into the nature of this controversy, it will be sufficient to observe, that Reuchlin found himself compelled to carry his cause to Rome, for the definitive sentence of the papal see. Here he had many friends, and his agent carried with him strong recommendations from princes, prelates, and men of the greatest eminence in the learned world. These recommendations had great weight in the court of Leo X., and Reuchlin was honourably acquitted of the heresy with which he was charged, to the great mortification of his bigotted and malignant enemies. Amidst the troubles which he met with he prosecuted his studies with unabated ardour, and published some very learned and profound works. Although, as we have seen, he triumphed over his enemies at the court of Rome, they did not cease to trouble him, by the invention of groundless calumnies, and the most bitter invectives; so that, notwithstanding his great talents, he was scarcely able, by teaching the Greek and Hebrew languages, to keep himself from want. He died in the year 1521, at the age of sixty-eight. His principal works, independently of those already noticed, are, "The Life of Constantine the Great," written by Eusebius: a treatise "De Verbo Mirifico," in the form of a dialogue between a philosopher, a Jew, and a Christian; and another treatise "De Arte Cabbalifica." For his great and successful attempts towards the revival of learning, his name is deserving of being remembered with gratitude by posterity. His collection of "Letters from illustrious Men," of which an edition was published at Zurich in 1558, is said to be full of valuable information concerning the literary history of his time. Dupin speaks of him as one of the most learned men of that age; and he adds, that notwithstanding his attachment to his peculiar studies, he had a wonderful genius for the belles lettres; was intimately conversant with the Grecian philosophers and orators; was a perfect master of the Greek language, and spoke Latin with an inimitable purity and elegance; and that he was the only person of whom Germany at that time could boast, who deserved to be regarded as a competitor for fame with all the learned men in Italy, who was their equal in the delicacy of his style, while he greatly excelled them in erudition. Moreri. Dupin. Enfield's Hist. Phil. vol. ii.

REUDEN, in *Geography*, a town of Saxony; 5 miles N.W. of Bitterfeld.

REUDZEL, a river of European Turkey, which runs into the Reut, 18 miles W. of Floreszti, in Moldavia.

REVE, or GREVE, in *Ancient Customs*, the bailiff of a franchise, or manor, thus called; especially in the western parts.

Hence, shire-reve, sheriff, port-greve, church-reve, &c. See SHERIFF, PORT-GREVE, &c.

REVE, *Reva*, is also used for a duty or imposition on merchandizes imported.

M. Du-Cange derives the word from the Latin *roga*, of *rogare*, to ask; the word formerly signifying a tribute anciently granted princes at their request, as a free gift.

REVEALED RELIGION. See RELIGION and REVELATION.

REVEALED *Theology*. See THEOLOGY.

REVEILLE, formed of the verb *reveiller*, to awake, a beat of drum in the morning, intended to give notice that it

is day-break; and that the foldiers are to arife, and the fentinals forbear challenging.

REVEL, in *Geography*, a town of France, and principal place of a diftrict, in the department of the Upper Garonne; 21 miles N.W. of Careaffone. N. lat. $43^{\circ} 28'$. E. long. $2^{\circ} 5'$.—Alfo, a town of France, in the department of the Ifere; 15 miles S.E. of Vienne.—Alfo, a fea-port town of Ruffia, on the Baltic, and capital of a province; the fee of a Lutheran bifhop, fuffragan to the archbifhop of Riga. Although this place be not large, it is opulent and well fortified; and has confiderable trade. The town and caſtle were founded, in 1218, by Waldemar II., king of Denmark, on the ſcite of the convent of St. Michael, founded by his anceftors, and in 1320 included within its walls. Revel, and alfo the whole duchy of Eſthonia, received moſt of its privileges from the Daniſh kings; and the arms of Denmark, with infcriptions in the Daniſh language, are ſtill ſeen in the churches and other public offices. The houſes are generally built of brick, and the ſtreets are ſomewhat regular. The only congregations here, beſides thoſe of the Ruffian church, are Lutheran. The tolls, belonging partly to the magiftracy, and partly to the crown, are confiderable. This town has its own arſenal, and maintains a number of matroſſes, and a company of foldiers. Revel formerly held a diſtinguiſhed rank among the Hanſe towns, and it is ſtill a ſtaple-town, with a flouriſhing trade. Its harbour is ſpacious and convenient, and uſually accommodates a part of the Ruffian fleet. It is ſurrounded with high walls, ſtrengthened with baſtions, and a deep ditch; and it is alſo fortified with a caſtle, ſeated on a rock, and ornamented with ſeveral towers. Without the walls the citizens have pleaſant gardens. This city was erected into a biſhopric by Waldemar II. It was totally deſtroyed by fire in 1433. In 1710 it was ſurrendered to Peter the Great, who confirmed its ancient privileges, and reſtored others of which it had been deprived by the crown of Sweden; 144 miles N. of Riga. N. lat. $59^{\circ} 20'$. E. long. $24^{\circ} 34'$.

REVEL'S Iſland, a ſmall iſland near the coaſt of Virginia. N. lat. $37^{\circ} 35'$. E. long. $75^{\circ} 43'$.

REVE-LAND, the land which in Domeſday is ſaid to have been *thane-land*, and afterwards converted into *reveland*, ſeems to be ſuch land as, being reverted to the king after the death of the thane, who had it for life, was not ſince granted out to any by the king, but reſted in charge upon the account of the *reeve*, or bailiff of the manor. Spelm. Feuds, cap. 24.

REVELATION, REVELATIO, formed from *revelo*, of *re*, and *velum*, *q. d. to unveil*, the act of revealing, or making a thing public, which before was a ſecret, or unknown.

The revelation of a confeſſion, made by the confeſſor, is adjudged, in the Romiſh church, to deſerve the moſt exemplary puniſhment.

REVELATION is uſed, by way of eminence, for the diſcoveries made by God to his prophets, &c. and by them to the world.

REVELATION is more particularly uſed for the diſcovery which God has made to the world, by the mouths of his prophets, of certain points of faith and duty, which they could not learn from natural reaſon.

Religion is divided into natural religion and revelation, or revealed religion. See RELIGION.

By revealed religion, as diſtinguiſhed from that which is uſually called natural, we are to underſtand that knowledge of religion which was originally communicated in an extraordinary and ſupernatural way. A revelation of this kind muſt either be by an immediate infallible inſpiration, or

illumination of every particular perſon, for informing and directing him with regard to the knowledge and practice of religion; or by God's making an extraordinary diſcovery of himſelf and of his will to ſome perſon or perſons, who ſhould be commiſſioned to communicate it to others in his name. In the former caſe it could not be properly called extraordinary revelation; for if it were an univerſal infallible light, imparted to every ſingle perſon in every nation and every age, from the beginning of the world, it would be as common and familiar to every one as the common light of reaſon, and by being univerſal would ceaſe to be extraordinary. Whereas, if there be ſuch a thing as revealed religion, or if it hath pleaſed God to make diſcoveries of his will to mankind with reſpect to religious truth and duty, in a way of extraordinary revelation, the moſt natural mode of doing it, and that which is beſt accommodated to the preſent ſtate of mankind, ſeems to be, that the revelation ſhould be communicated to ſome perſon or perſons, to be by them communicated to others in his name; at the ſame time furniſhing them with ſufficient proofs and credentials, to ſhew that they were indeed ſent and inſpired by him, and that the doctrines and laws which are the matter of ſuch revelation, and which they are authorized to publiſh to the world in his name, were really and originally communicated by revelation from him. This method admits of ſufficient proof being given to ſatisfy well-diſpoſed minds, and of proviſion being made for inſtructing men, unleſs it be their own fault, in the knowledge of religion, and engaging them to the practice of the duties which it requires; and, at the ſame time, there is room for the exerciſe of reaſon in examining the nature of the evidence, and the trial of men's ſincerity and diligence, of their impartial love of truth, and their openneſs to receive it.

Several queſtions preſent themſelves to our conſideration, with regard to that kind of revelation that has been now ſtated. The *firſt* relates to the poſſibility of it; the *ſecond*, to its uſefulneſs and expediency, and even the neceſſity of it in the preſent ſtate of mankind; the *third* relates to the proofs and evidences, by which it may be ſhewn, that ſuch a revelation hath been actually given.

As to the *firſt* queſtion, the affirmative cannot reaſonably be doubted by any one, much leſs denied, who believes a God and a Providence. Can it be ſuppoſed, that the Author of our being, and of our faculties, hath it not in his power to communicate ideas to our minds, for inſtructing and informing us in what it nearly concerns us to know?

It is acknowledged, even by lord Bolingbroke, a writer of diſtinguiſhed rank among the oppoſers of revelation (Works, vol. ii. p. 468, ed. 4to.), “that an extraordinary action of God upon the human mind, which the word ‘inſpiration’ is now uſed to denote, is not more inconceivable than the ordinary action of mind upon body, or body on mind;” and “that it is impertinent to deny the exiſtence of any phenomenon, merely becauſe we cannot account for it.” Moreover, as God can, if he thinks proper, communicate his will to mankind, he can alſo do it in ſuch a manner, as to give to thoſe to whom it is originally and immediately made, a full and certain aſſurance of its being a true divine revelation. Beſides, God can commiſſion thoſe to whom he has made an extraordinary revelation of his will, to communicate to others what they have received from him; and can furniſh them with ſuch credentials of their divine miſſion as are ſufficient to prove that he ſent them, and that the doctrines and laws which they deliver in his name were indeed received from God. The omnipotent Author of nature, and Lord of the univerſe, can undoubtedly, if he thinks fit, enable ſuch perſons to perform the moſt wonderful works in

REVELATION.

his name, as a proof that he sent them; works of such a nature, and so circumstanced, as manifestly to transcend all human power, and bear the evident marks of a divine interposition. (See MIRACLE.) He can also endue them with supernatural gifts, and enable them to deliver express predictions of future contingent events, which no human sagacity could foresee, and which yet shall be accomplished in the proper season. (See PROPHECY.) It should also be further observed upon this subject, that not only they who live in the age when the revelation was first published to the world may have such proofs of it as may be sufficient to convince them of its divine authority and original, but that it may be transmitted with such evidence to those who live in succeeding ages, as may lay them under an obligation to receive and submit to it as a revelation from God. Although oral tradition is not a very sure conveyance, yet it is undeniable, that writings may be transmitted with such a degree of evidence as to leave no room for reasonable doubt. This is the most simple and natural way of propagating the knowledge of revelation to succeeding ages. Such is the fact with regard to the revelation contained in the holy scriptures: nor is it difficult to prove, that we have greater evidence of the safe transmission of these sacred writings, without any general and material corruption and alteration, than we have concerning other books, the genuineness of which is universally acknowledged. To this kind of argument it can only be objected, that moral evidence is uncertain, and historical human testimony fallible; but to the objection the reply is obvious, that this kind of evidence may be, and frequently is, so circumstanced, that the man would scarcely be thought in his senses who should seriously deny or doubt of it. It is by moral evidence, and the testimony of fallible men, capable of deceiving and of being deceived, that a man who has never been at Paris or Rome knows that there are such cities, and yet he can no more reasonably doubt of it, than if he had seen them with his own eyes. It is by moral evidence, that we have all our laws and records, and the assurance of any past facts. And yet is there any man of sense, who does not as certainly believe many facts which were done in former ages, as he believes any event that has happened of late years, and within his own memory? It is by this kind of evidence of testimony that we are necessarily guided and determined in many cases of great importance: and why should it be thought absurd to suppose, that it should be so ordered by the Author of our frame and the great Ruler of the world, that our knowledge of some important matters relating to religion should be obtained by this mode of conveyance? He that receives divine revelation upon this kind of evidence acts a wise and good part, becoming a reasonable being and a moral agent.

Having shewn that a revelation from God is possible, the second subject of consideration is the great usefulness and advantage of divine revelation, and the necessity of it in the present state of mankind, for supporting and promoting the interests of religion and virtue in the world. Such a revelation may be of great use even with regard to those truths and principles which lie at the foundation of all religion; such are the truths which relate to the excellent and unparalleled nature, the perfections and attributes of the one supreme God. (See GOD.) A divine revelation may also be very useful in establishing the belief of the providence of God; and further, in communicating instruction even to those, who allow that some kind of religious worship and homage should be rendered to God by his reasonable creatures. What kind of worship will be most acceptable to the Supreme Being, and what rites are most proper to be used in his service, are questions which unassisted reason cannot positively and

with certainty determine. The doctrine of the immortality of the soul, and of a future state of retribution, is unquestionably of very great importance to mankind; and the natural and moral arguments to prove it have certainly great weight; but they are assailed by difficulties and objections which weaken the evidence, and may occasion suspicion and doubt, if natural reason be our only guide and umpire. Accordingly some of the most eminent ancient philosophers either denied this doctrine, or expressed themselves doubtfully and waveringly concerning it. If then God himself should, by a well-attested revelation, assure us, that death shall not put an utter end to our being; that the present life is only the first stage of our existence; that we shall be raised again from the dead; and that God will call all men to an account, and reward or punish them in a future state according to their behaviour in this; and should also signify to us the nature of those rewards and punishments, and the qualifications of the persons on whom they shall be conferred or inflicted: this must needs be of high advantage, and tend to give us satisfaction in a point of considerable importance, for encouraging men in the practice of virtue, and delivering them from vice and wickedness. Moreover, we are led by the light of nature and reason to entertain some hope, that God will shew mercy to sinners upon their repentance and amendment; but how far this mercy shall extend, whether he will pardon sins of every kind, even the most heinous, frequently repeated, and long persisted in, merely upon repentance and amendment; and whether his pardon in this case will be only a mitigation or remission of the threatened penalty, without a full restitution to grace and favour, and how far he will reward an obedience attended with failures and defects:—these things might create anxious doubts and perplexities to serious and thoughtful minds. Especially when it is further considered, that reason leads us to regard God as just as well as merciful, a wise and righteous governor, who will therefore exercise his pardoning mercy in such a way as seemeth most fit to his rectoral wisdom, and will best answer the ends of moral government; and of this such short-sighted creatures as we are cannot pretend to be competent judges. A revelation from God satisfying mankind, and especially anxious penitents, with regard to these interesting questions, and assuring them by express promise, as well as by its representations of the placability of God, and of the provision which he has made for the pardon of repenting transgressors in perfect confidence with all the attributes of his nature and laws of his government, must be a very great benefit to the world. The assistance promised and certified by revelation, to those who use their own earnest endeavours in the performance of their duty, must further evince its importance and utility. Besides, the benefits of a divine revelation further extend to those laws and duties which we owe to God, our neighbours, and ourselves, and which are comprehended under the class of moral obligations. But though revelation is thus eminently useful, and even necessary, it is not designed to supersede the use of our own reason, or to render the exercise of it needless, but to guide, improve, and perfect it. Revelation, so far from discarding or weakening any argument that can be justly brought from reason, in proof of any truths relating to religion or morality, adds to them the attestation of a divine authority or testimony, which is of great weight. This both gives us a farther degree of certainty with regard to those things which are in some degree discoverable by the light of reason, and also furnishes us with a sufficient ground of assent, with respect to those things which mere unassisted reason, if left to itself, would not have discovered, and which yet it may be of use for us to know.

By the common consent of mankind, a competent authority is, in many cases, a good and proper medium to assure us of the truth of things; and to believe upon the credit of such an authority and testimony, is so far from being a renunciation of our reason, as some have pretended, that, on the contrary, it is what reason and good sense require; and to decline it would be to act an absurd and unreasonable part. Admitting that a supposed revelation from God is established upon sufficient evidence, we are bound to receive what is revealed upon the authority of the revealer; inasmuch that it would be a contradiction to believe it to be a revelation from God, and yet refuse our assent to it: since it is a most unquestionable principle, that, as God is incapable of deceiving or of being deceived, whatsoever he hath revealed must be true.

This leads us to the *third* subject of inquiry proposed in reference to divine revelation, *viz.* what are the proofs and evidences by which it may be known that such a revelation has been actually communicated to mankind, and that the revelation which we have in our possession is entitled to this character. We may observe in general, that it has been the sense of mankind in all ages and nations, that God hath made a revelation of his will to man; and this prevalent opinion has been probably derived from a tradition of some extraordinary revelation, or revelations, communicated in the earliest times to the first ancestors of the human race, from whom it has been transmitted to their descendants; though, in process of time, it has been in a great measure corrupted and lost. Or at least we may hence conclude, that men have generally thought that a revelation from God to man was both possible and probable; and that this was agreeable to the ideas they had formed of the wisdom and goodness of God, and of his concern for mankind. It would lead us far beyond the limits of this article, particularly to state the proofs that have been alleged for the divine authority of the Jewish and Christian revelation; both of which refer to and confirm the original revelation made to mankind from the beginning. But this is the less necessary, as the subject is discussed in various parts of the Cyclopædia. See BIBLE, CANON, CHRISTIAN Religion, RELIGION, RESURRECTION of Christ, SCRIPTURE, TESTAMENT, &c.

The Christian revelation is that made by Christ, and his apostles, in the New Testament. The Jewish revelation is that made by Moses and the prophets, in the Old Testament. See CHRISTIAN Religion, and JUDAISM.

A late author observes, somewhat invidiously, that it is the common method of all new revelations, to be built on precedent ones. Thus, the mission of Moses to the Israelites supposes a former revelation to Abraham, &c. The mission of Christ supposes that of Moses; and the pretended mission of Mahomet supposes the mission of Christ. The mission of Zoroaster to the Persians supposes the religion of the Magi, &c.

The general foundation of all revelation is this, that God is pleased man should know something relating to himself, his own nature, dispensation, &c. which the natural faculties with which he was pleased to create him could not attain to; and that he requires some duty or service at our hands, more than what necessarily follows from the relation we are under to him as our creator, preserver, &c.

This is also urged by deists, to the discredit of all particular revelations, as derogating from the perfections of God; such supplementary informations and instructions arguing, according to them, a prior deficiency in the established economy of nature, of which he is the author. But many able answers have been given to such cavils.

Particular or occasional revelations have their particular

geniuses, characteristics, and designs. That made by Moses and the prophets chiefly related to the nation of the Jews, considered as the descendants of Abraham: its design seems to have been to rescue that people from their slavery; to settle them in a new plantation; to give them a set of laws; to new-form their manners; to support them under difficulties and dangers of their enemies, from an opinion of their being under the immediate direction and appointment of God; to keep them from intermixing again with their neighbours, from an opinion of their being a chosen people, and of a Messiah to be born among them; and thus to preserve and transmit the knowledge of the unity of God, in opposition to idolatry and polytheism, and the hope of the Messiah, till the period of his appearance arrived. To some or other of these ends do all the Old Testament prophecies seem to tend.

The Christian revelation is founded on a part of the Jewish. The Messiah promised in the one is revealed in the other.

All the rest of the Jewish revelation, which related peculiarly to the Jewish people, is here set aside; and only that part of it in which the world in general was interested, and that relating to the advent, offices, and character of the Messiah, are retained.

Indeed, it must be owned, the Jews ever looked on this to be as peculiar to themselves as any of the rest; the Messiah was promised to them; he was to be their deliverer, their restorer, &c. and under this character he actually appeared. But, upon taking place of this new revelation, a new scene was opened, different from what many of them apprehended, because they misinterpreted the prophecies relating to the Messiah. The ceremonial part of their institution, local and temporary in its establishment and use, was abolished; and the Messiah appeared, not, as they erroneously imagined, to be the restorer of their civil sovereignty and liberties, which were now fallen into the hands of the Romans; but to restore and re-establish mankind in general, who had lost their original righteousness, and were become slaves of sin; to preach repentance and remission; and at last to suffer death, that all who believed in him might not die, but have everlasting life.

Such are the tenor and design of the Christian revelation, which, in the event, was so far from being what it had been apprehended to be by the people to whom it was first promised, that it proved the very reverse; and, instead of re-establishing and confirming the other branches of their revelation, it superseded, and set them all aside. The pale was now broken down, and the being of the seed of Abraham ceased to be a privilege, all the world being invited on the same terms with the Jews.

The consequence was, that the Jews, denying this to be the Messiah that had been promised to them, because their pride and prejudice prevented their discerning the accomplishment of their ancient prophecies in him, were generally excluded from the privileges of that mission, which they had vainly supposed to be not only primarily but wholly intended for themselves; and had their ruin completed from the very means whence they expected their redemption: because they expected a redemption, different in its nature from that which their own prophecies, fairly interpreted, proposed.

REVELLO, in *Geography*, a town of France, in the department of the Stura, near the Po, seated on the summit of a very high mountain, fortified both by nature and art. Having formerly served as a place of refuge for the marquises of Saluzzo, and withstood many attacks from their enemies, it was taken by the French; and in 1588 it surrendered to Charles Emanuel I., duke of Savoy. It contains one parochial church, and three other churches, a castle,

castle, a palace, and a convent of Dominicans; 3 miles N.W. of Saluzzo.

REVELS, formed from the French *reveller, to awake*, as alluding to the night season, when they were chiefly held; entertainments of dancing, masking, gaming, acting comedies, farces, &c. anciently very frequent in inns of courts, at certain seasons, and in noblemen's houses, &c. but now much difused.

The officer who has the direction or ordering of the revels at court, is called the *master of the revels*.

REVELSKOI, in *Geography*, a province of Russia, so called from *Revel* the capital, bounded on the N. and W. by the Baltic, on the E. by the government of Petersburg, and on the S. by the government of Riga; about 144 miles in length, and from 16 to 60 in breadth; formerly the duchy of Esthonia. N. lat. 58° 20' to 59° 30'. E. long. 23° to 28'. See ESTHONIA and REVEL.

REVENGE, in *Ethics*, is an insatiable desire to sacrifice every consideration of pity and humanity to the principle of vindictive justice. It renders the demands of that terrific giant paramount to every other claim. It is a propensity to retaliate evil, too fervent to be cooled by time, too deep and inveterate to be obliterated by concessions and intreaties. It anticipates joy in the contemplation of sighs and groans, and the only moment of transport is the instant of inflicting misery. This disposition approaches very near to permanent malevolence of the most despicable character. The abstract idea of justice, however, forms a partition between them; for to this, malevolence has no rightful claim. But its more honourable distinction consists in that repentance, which humanity excites in the mind that is not totally obdurate, after the gratification of this dreadful passion.

Anger long indulged to excess is apt to produce revenge. See ANGER.

REVENUE, the yearly rent or profits arising to a man from his lands, possessions, &c.

The word is French, formed from *revenir, to return*. Whence revenue is sometimes also used in ancient authors for a return; as the revenue of Easter.

The revenues of the English clergy were first fixed by king Ethelwulph, anno 853, who granted them for ever the tithe of all goods, and the tenth part of all the lands of England, free from all secular service, taxes, impositions, &c. Though Rapin observes, that tithes were settled on the clergy by the laws of Ina and Offa. But these laws were probably not observed, or perhaps Ethelwulph extended the law of tithes all over England. See TITHE.

The certain revenues of the king of England were anciently greater than those of any king in Europe; and till the time of the civil wars they enjoyed, in domains and fee-farm rents, almost enough to discharge all the ordinary expenses of the crown, without any tax or imposition on the subject.

The revenue which the British constitution hath vested in the royal person, in order to support his dignity, and maintain his power, is either *ordinary* or *extraordinary*.

The king's *ordinary* revenue is such as hath either subsisted time out of mind in the crown, though, by reason of royal grants, the king be not at present in the actual possession of the whole of it; or else has been granted by parliament, by way of purchase or exchange for such of the king's inherent hereditary revenues, as were found inconvenient to the subject. Of the king's ordinary revenues there are four, which are of an ecclesiastical kind. Such are, 1. The custody of the temporalities of bishops, or all the lay revenues, lands, and tithes, (in which is in-

cluded his barony,) which belong to an archbishop's or bishop's fee, and which, upon the vacancy of the bishopric, revert immediately to the king, as his right, during the vacancy. This branch of the royal revenue was formerly very considerable, but is now, by customary indulgence, reduced almost to nothing; for, at present, as soon as the new bishop is consecrated and confirmed, he usually receives the restitution of his temporalities, entire and untouched, from the king; and then, but not sooner, he has a fee-simple in his bishopric, and may maintain an action for the profits. (Co. Litt. 67. 341.) 2. A corody out of every bishopric, or a right of sending one of his chaplains to be maintained by the bishop, or to have a pension allowed him till the bishop promotes him to a benefice (F. N. B. 230.); which is now fallen into total disuse; though sir Matthew Hale says, that it is due of common right, and that no prescription will discharge it. 3. The tithes arising in extra-parochial places, which are held, indeed, under an implied trust, that the king will distribute them for the good of the clergy in general. (2 Inst. 647.) 4. The first-fruits and tenths of all spiritual preferments in the kingdom. See FIRST-FRUITS and TENTHS.

The following branches of the king's ordinary revenue are of a lay or temporal nature. 5. The first of these consists in the rents and profits of the demesne lands of the crown, which are either the share reserved to the crown at the original distribution of landed property, or such as came to it afterwards by forfeitures or other means, and were formerly very extensive, but are now contracted within a very narrow compass, having been almost entirely granted away to private subjects. 6. The advantages which used to arise to the king from the profits of his military tenures, to which most lands in the kingdom were subject, till they were in a great measure abolished by the statute 12 Car. II. cap. 24. to which may be also referred the profitable prerogative of purveyance and pre-emption; which branches of the royal revenue and power were resigned entirely by king Charles at his Restoration; in recompence for which, the parliament settled on him, his heirs and successors for ever, the hereditary excise of fifteen pence *per barrel* on all beer and ale sold in the kingdom, and a proportionable sum for certain other liquors; so that this hereditary excise forms the sixth branch of his majesty's ordinary revenue. 7. The rents payable to the crown by such persons as are licensed to sell wine by retail throughout England, except in a few privileged places, first settled on the crown by the statute 12 Car. II. cap. 25. but abolished by the statute 30 Geo. II. cap. 19. when an annual sum of upwards of 7000*l. per annum*, issuing out of the new stamp duties imposed on wine licences, was settled on the crown in its stead. 8. The profits arising from the king's forests, consisting principally in ameracements or fines levied for offences against the forest-laws, for levying which, few, if any, courts have been held since 1632, 8 Car. I. 9. The profits arising from the king's ordinary courts of justice; consisting not only in fines imposed upon offenders, forfeitures of recognizances, and ameracements levied upon defaulters, but also in certain fees due to the crown in a variety of legal matters; as for setting the great seal to charters, original writs, and other forensic proceedings, and for permitting fines to be levied of lands in order to bar entails, or otherwise to insure their title. These, in process of time, have been almost all granted to private persons, or else appropriated to certain particular uses. All future grants of these, by 1 Ann. stat. 2. cap. 7. are to endure for no longer time than the prince's life who grants them. 10. The right to royal fish. 11. The revenue arising from shipwrecks, which

REVENUE.

is frequently granted out to lords of manors, as a royal franchise. (See WRECK.) 12. The right to mines of silver and gold. (See MINE.) 13. The revenue of treasure-trove. 14. Waifs. 15. Eltrays, which the law gives to the king as the general owner and lord paramount of the soil; though they now most commonly belong to the lord of the manor, by special grant from the crown. 16. Forfeitures of lands and goods for offences. (See CONFISCATE and DEODAND.) These are for the most part granted out to the lords of manors, or other liberties. 17. The revenue arising from the escheats of lands, reverting, upon the default of heirs to succeed to the inheritance, to the king, who is esteemed, in the eye of the law, the original proprietor of all the lands in the kingdom. 18. The last branch of the king's ordinary revenue consists in the custody of idiots.

Such is the king's ordinary revenue, or the proper patrimony of the crown, which was formerly very large, and capable of being increased to a magnitude truly formidable: but, fortunately for the liberty of the subject, this hereditary landed revenue is now sunk almost to nothing; and the casual profits, arising from the other branches of the *cenfus regalis*, are likewise almost all of them alienated from the crown. In order to supply the deficiencies of which, we are now obliged to have recourse to new methods of raising money, unknown to our early ancestors; which methods constitute the king's *extraordinary* revenue. See TAX, FUND, and NATIONAL Debt.

We shall here observe, that the aggregate fund stood mortgaged by parliament to raise an annual sum for the maintenance of the king's household, and the civil list. For this purpose, in the late reigns, the produce of certain branches of the excise and customs, the post-office, the duty on wine licences, the revenue of the remaining crown lands, the profits arising from courts of justice, (which articles include all the hereditary revenues of the crown,) and also a clear annuity of 120,000*l.* in money, were settled on the king for life, for the support of his majesty's household, and the honour and dignity of the crown. And, as the amount of these several branches was uncertain, (though in the last reign they were computed to have sometimes raised almost a million,) if they did not arise annually to 800,000*l.*, the parliament engaged to make up the deficiency. But his present majesty, soon after his accession, having accepted the limited sum of 800,000*l.* *per annum* for the support of his civil list, (charged also with three life-annuities, to the princess of Wales, the duke of Cumberland, and the princess Amelia, to the amount of 77,000*l.*) the said hereditary and other revenues were made a part of the aggregate fund, which was charged with the payment of the whole annuity to the crown of 800,000*l.* *per annum*. The expences formerly defrayed by the civil list were those that in any shape relate to civil government: as the expences of the household; all salaries to officers of state, to the judges, and each

of the king's servants; the appointments to foreign ambassadors; the maintenance of the queen and royal family; the king's private expences, or privy purse; and other very numerous outgoings, as secret service money, pensions, and other bounties; which sometimes have so far exceeded the revenues appointed for that purpose, that application has been made to parliament to discharge the debts contracted on the civil list; as particularly in 1724, when one million was granted for that purpose by the statute 11 Geo. I. cap. 17; and in 1769 and 1777, when half a million and 600,000*l.* were appropriated to the like use, by the statutes 9 Geo. III. cap. 34. and 17 Geo. III. c. 47. Many of these expences are now charged on the consolidated fund, and the civil list comprehends the support of his majesty's household.

The civil list is, indeed, properly the whole of the king's revenue in his own distinct capacity; the rest being rather the revenue of the public, or its creditors, though collected and distributed again in the name and by the officers of the crown.

The whole revenue of queen Elizabeth did not amount to more than 600,000*l.* a-year; that of king Charles I. was 800,000*l.*; and the revenue voted for king Charles II. was 1,200,000*l.*; but under these sums were included all kinds of public expence. The same revenue, subject to the same charges, was settled on king James II. (Stat. 1 Jac. II. c. 1.) But by the increase of trade, and better management, it amounted on an average to a million and a half *per annum*, (beside other additional customs, granted by parliament, (ibid. c. 3. and 4.) which produced an annual revenue of 400,000*l.*), out of which his fleet and army were maintained at the yearly expence of 1,100,000*l.* At this time the revenues of the king of France were computed at seven millions sterling; and those of the states of Holland at three millions. After the Revolution, when the parliament took into its own hands the annual support of the forces, both maritime and military, a civil list revenue was settled on the new king and queen, amounting, with the hereditary duties, to 700,000*l.* *per annum*; and the same was continued to queen Anne and king George I. That of king George II. was nominally augmented to 800,000*l.* (stat. 1 Geo. II. c. 1.); and in fact was considerably more. But that of his present majesty was avowedly increased to the limited sum of 900,000*l.* The clear yearly sum of 100,000*l.*, to commence from the fifth of January 1777, over and above the sum of 800,000*l.* before granted, was granted to his majesty out of the aggregate fund by stat. 17 Geo. III., but is now chargeable on the consolidated fund. Blackst. Com. vol. i. chap. viii. See FUND, and the sequel of this article.

The following particulars, relating to the revenue, are extracted from the Report presented to the house of commons, ending 5th January 1814.

REVENUE.

An Account of the Ordinary Revenues and Extraordinary Resources constituting the Public Income of Great Britain, for the Year ending the 5th of January 1814.

Heads of Revenue.	Gross Receipt within the Year.	Total Sum to be accounted for, deducting outstanding Balances and Bills.	Net Produce applicable to National Objects, and to Payments into the Exchequer, deducting total Payments out of the gross Revenue.	Payments into the Exchequer, deducting total Payments out of the net Produce.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
ORDINARY REVENUES.				
<i>Permanent and Annual Taxes.</i>				
Customs - - - - -	10,325,550 19 10 ¹ / ₄	10,938,523 16 7 ¹ / ₂	8,086,313 2 9 ¹ / ₂	7,015,968 19 11 ¹ / ₄
Excise - - - - -	20,805,852 14 1 ¹ / ₂	21,119,321 9 6	18,526,879 4 9 ¹ / ₂	18,039,713 19 2 ¹ / ₄
Stamps - - - - -	5,638,155 17 10 ³ / ₄	5,873,174 14 7 ¹ / ₂	5,552,460 1 3 ¹ / ₄	5,344,486 13 11
Land and assessed taxes - - - - -	7,884,841 3 11 ³ / ₄	8,101,968 7 3 ¹ / ₄	7,803,459 3 4 ¹ / ₄	7,433,496 18 4 ³ / ₈
Post office - - - - -	1,938,517 10 6	2,137,437 12 5 ¹ / ₄	1,619,136 10 7 ¹ / ₄	1,403,000 0 0
One shilling in the pound } on pensions and salaries }	19,648 16 8	20,803 10 8	20,423 5 2	17,325 1 5 ¹ / ₂
Sixpence in the pound on } pensions and salaries - - }	11,728 17 0 ¹ / ₂	13,521 0 5 ¹ / ₂	12,151 15 11 ¹ / ₂	10,707 9 1 ³ / ₄
Hackney coaches - - - - -	25,181 10 0	25,551 19 3	22,245 6 1 ¹ / ₂	21,887 0 0
Hawkers and pedlars - - - - -	20,160 3 2 ¹ / ₂	20,779 14 4 ¹ / ₂	18,201 3 1	18,120 0 0
Total - - - - -	46,669,637 13 3 ¹ / ₄	48,251,082 5 2 ¹ / ₂	41,661,269 13 2	39,304,706 2 1
<i>Small Branches of the Hereditary Revenue.</i>				
Alienation fines - - - - -	6,817 3 4	9,539 12 1	8,392 4 1	4,069 12 0
Post fines - - - - -	516 13 9 ¹ / ₂	4,011 17 2	3,953 4 8	22,638 4 7
Seizures - - - - -	22,638 4 7	22,638 4 7	22,638 4 7	586 15 2
Compositions and proffers - - - - -	586 15 2	586 15 2	586 15 2	87,703 4 10
Crown lands - - - - -	84,930 13 7	90,096 18 5 ¹ / ₂	87,703 4 10	11,016 9 8
EXTRAORDINARY RESOURCES.				
War taxes {	3,818,272 14 9 ¹ / ₄	3,818,272 14 9 ¹ / ₄	3,275,358 5 4 ¹ / ₄	3,275,358 5 4 ¹ / ₄
Excise - - - - -	6,227,240 13 4	6,259,884 14 7 ³ / ₄	6,117,857 0 3 ¹ / ₄	6,073,538 4 5 ³ / ₈
Property tax - - - - -	14,318,816 4 1 ¹ / ₂	14,889,444 15 3 ³ / ₄	14,583,286 9 6 ¹ / ₂	13,965,808 7 2
Arrears of income duty	1,620 13 8	1,620 13 8	1,593 15 4 ¹ / ₂	1,593 15 4 ¹ / ₂
Lottery, net profit (of which one-third part is for the service of Ireland) - - - - -	310,800 0 0	310,800 0 0	278,666 6 6	278,666 6 6
Monies paid on account of the interest of loans raised for the service of Ireland - - - - -	3,198,475 2 10	3,198,475 2 10	3,198,475 2 10	3,198,475 2 10
On account of balance due by Ireland on joint expenditure of the united kingdom - - - - -	3,956,276 0 0	3,956,276 0 0	3,956,276 0 0	3,956,276 0 0
On account of the commissioners, appointed by act 35 Geo. III. c. 127. and 37 Geo. III. c. 27. for issuing exchequer bills for Grenada, &c. - - - - -	54,200 0 0	54,200 0 0	54,200 0 0	54,200 0 0
On account of the commissioners for issuing commercial exchequer bills, by act 51 Geo. III. c. 15. - - - - -	490,591 18 9	490,591 18 9	490,591 18 9	490,591 18 9
Carried forward - - - - -	79,161,420 11 2 ¹ / ₂	81,357,521 12 7 ³ / ₄	73,740,848 5 2	70,639,525 3 11 ¹ / ₂

REVENUE.

Heads of Revenue.	Gross Receipt within the Year.	Total Sum to be accounted for, deducting outstanding Balances and Bills.	Net Produce applicable to National Objects, and to Payments into the Exchequer, deducting total Payments out of the gross Revenue.	Payments into the Exchequer, deducting total Payments out of the net Produce.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Brought forward -	79,161,420 11 2½	81,357,521 12 7¾	73,740,848 5 2	70,639,525 3 11½
On account of the interest, &c. of a loan granted to the prince regent of Portugal -	57,170 3 0	57,170 3 0	57,170 3 0	57,170 3 0
Surplus fees of regulated public offices -	107,355 18 3	107,355 18 3	107,355 18 3	107,355 18 3
Imprest money repaid by fundry public accountants, &c. including interest -	56,504 1 10¾	56,504 1 10¾	56,504 1 10¾	56,504 1 10¾
Other monies paid to the public -	65,660 9 5	65,660 9 5	65,660 9 5	65,660 9 5
Total { independent of loans }	79,448,111 3 9¼	81,644,212 5 2½	74,027,538 17 8¾	70,926,215 16 6¼
Loans paid into the exchequer, including 6,000,000 <i>l.</i> for the service of Ireland -	35,050,574 17 9	35,050,574 17 9	35,050,574 17 9	35,050,574 17 9
Grand total -	114,498,686 1 6¼	116,694,787 2 11½	109,078,113 15 5¾	105,976,790 14 3¼

A General Statement of the Revenue of Customs of Great Britain.

	England.			Scotland.			Great Britain.		
	£	s.	d.	£	s.	d.	£	s.	d.
Gross receipt within the year, <i>viz.</i>									
Permanent and annual duties -	9,367,542	3	8½	713,392	0	9¼	10,080,934	4	5¾
War taxes -	3,523,205	9	8	295,067	5	1¼	3,818,272	14	9¼
	12,890,747	13	4½	1,008,459	5	10½	13,899,206	19	3

An Account of the Gross Actual Receipt in Money, &c. of the Excise Consolidated Duties, Unconsolidated Duties, Temporary War Taxes, and Tobacco and Malts, annual in England.

Articles.	Gross Actual Receipt in Money.			Net Produce of each Article.			Net Payments into the Exchequer.		
	£	s.	d.	£	s.	d.	£	s.	d.
Auctions -	343,530	16	8¾	335,184	4	1¼	335,184	0	0
Beer -	2,888,298	13	10¼	2,569,272	3	3½	2,569,272	0	0
Bricks and tiles -	300,184	8	10½	293,249	9	2¾	293,249	0	0
Candles -	311,305	15	6½	250,637	6	10¾	250,638	0	0
Cocoa nuts and coffee -	124,049	7	2¾	115,655	12	1¼	115,656	0	0
Cyder, perry, and verjuice -	25,197	17	8	20,996	4	10½	20,921	0	0
Glass -	614,054	14	8¼	383,531	6	5½	383,531	0	0
Hides and skins -	674,751	3	8¼	592,669	0	3	592,669	0	0
Hops -	53,537	2	1	36,051	19	2¾	36,052	0	0
Carried forward -	5,334,910	0	3¾	4,597,247	6	4¾	4,597,172	0	0

REVENUE.

Articles.	Gross Actual Receipt in Money.			Net Produce of each Article.			Net Payments into the Exchequer.		
	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward	5,334,910	0	3 $\frac{3}{4}$	4,597,247	6	4 $\frac{3}{4}$	4,597,172	0	0
Licences	439,892	15	0 $\frac{1}{2}$	433,750	5	4 $\frac{1}{4}$	433,751	0	0
Malt	1,120,558	12	10	1,119,461	11	9 $\frac{3}{4}$	1,119,462	0	0
Paper	419,570	17	3 $\frac{1}{4}$	372,976	10	11 $\frac{3}{4}$	372,976	0	0
Printed goods	947,029	1	3	322,145	19	0	322,146	0	0
Salt	1,548,092	14	5 $\frac{3}{4}$	1,394,253	10	10	1,394,254	0	0
Soap	643,039	16	7 $\frac{1}{4}$	551,468	12	9 $\frac{1}{4}$	551,468	0	0
Spirits { British	1,036,503	17	1 $\frac{1}{4}$	1,620,883	6	3	1,620,883	0	0
{ Foreign	1,499,110	8	8 $\frac{1}{4}$	1,423,359	11	5 $\frac{1}{2}$	1,423,488	0	0
Starch	37,422	6	0 $\frac{1}{4}$	29,178	8	5	29,179	0	0
Stone bottles	2,538	3	5 $\frac{3}{4}$	2,279	18	2 $\frac{1}{2}$	2,280	0	0
Sweets and mead	25,453	6	9	25,337	10	3	25,275	0	0
Tea	2,048,096	0	0 $\frac{1}{2}$	1,914,739	17	7 $\frac{1}{2}$	1,914,739	4	5 $\frac{3}{4}$
Tobacco and snuff	383,870	9	6	382,001	5	5 $\frac{1}{4}$	382,002	0	0
Vinegar	42,593	16	2 $\frac{3}{4}$	42,155	2	6	42,154	0	0
Wine	1,100,583	12	3 $\frac{3}{4}$	980,652	17	11 $\frac{1}{2}$	980,653	0	0
Wire	12,887	18	4 $\frac{1}{2}$	11,537	10	4 $\frac{1}{2}$	11,532	0	0
Total consolidated duties	17,242,153	16	3 $\frac{1}{2}$	15,223,429	5	7 $\frac{1}{2}$	15,223,414	4	5 $\frac{3}{4}$
Spirits { British, per 51 Geo. III. c. 59.	5,202	3	3	5,129	4	9	5,129	0	0
{ Foreign, do.	28,182	7	0 $\frac{1}{4}$	28,174	14	7 $\frac{1}{4}$	28,175	0	0
Total unconsolidated duties	33,384	10	3 $\frac{1}{4}$	33,303	19	4 $\frac{1}{4}$	33,304	0	0
<i>Temporary War Taxes.</i>									
Malt, per 43 Geo. III. c. 81.	2,205,229	10	7	2,187,270	1	2 $\frac{1}{2}$	2,187,270	0	0
Sweets do.	4,220	2	4 $\frac{3}{4}$	4,219	11	4 $\frac{3}{4}$	4,236	0	0
Spirits { British do.	580,612	6	4	580,465	11	10	580,466	0	0
{ Foreign do.	742,262	2	3 $\frac{1}{4}$	742,111	10	1 $\frac{3}{4}$	742,111	0	0
Tea	2,055,263	18	8	1,960,299	17	11 $\frac{3}{4}$	1,960,300	4	5 $\frac{3}{4}$
Tobacco and snuff, per 46 Geo. III. c. 39.	312,534	3	6	310,566	17	6 $\frac{3}{4}$	310,567	0	0
Brandy, { per 47 Geo. III. c. 27.	58,166	14	2 $\frac{3}{4}$	58,050	16	11	58,051	0	0
&c. { 52 Geo. III. c. 3.	7,821	7	3 $\frac{1}{4}$	7,820	1	4 $\frac{3}{4}$	7,777	0	0
Total temporary war taxes	5,966,110	5	3	5,850,804	8	6	5,850,778	4	5 $\frac{3}{4}$
<i>Annual Duties.</i>									
Tobacco and snuff, com. 26 March	483,081	9	1	453,262	6	3 $\frac{1}{4}$	453,263	0	0
Malt, additional do.	893,592	8	9 $\frac{3}{4}$	893,158	16	7 $\frac{1}{4}$	893,196	0	0
Malt, old, com. 24 June	552,951	11	2 $\frac{1}{4}$	423,808	15	8 $\frac{3}{4}$	423,782	0	0
Total annual duties	1,929,625	9	1 $\frac{1}{2}$	1,770,229	18	7 $\frac{1}{4}$	1,770,241	0	0
<i>Totals collected.</i>									
Consolidated duties	17,242,153	16	3 $\frac{1}{2}$	15,223,429	5	7 $\frac{1}{2}$	15,223,414	4	5 $\frac{3}{4}$
Unconsolidated duties	33,384	10	3 $\frac{1}{4}$	33,303	19	4 $\frac{1}{4}$	33,304	0	0
Temporary war taxes	5,966,110	5	3	5,850,804	8	6	5,850,778	4	5 $\frac{3}{4}$
Annual duties	1,929,625	9	1 $\frac{1}{2}$	1,770,229	18	7 $\frac{1}{4}$	1,770,241	0	0
Grand total	25,171,274	0	11 $\frac{3}{4}$	22,877,767	12	1	22,877,737	8	11 $\frac{1}{2}$

REVENUE.

An Account of the Gross Actual Receipt, &c. of the Excise in Scotland.

Duties.		Gross Actual Receipt.			Net Produce.			
		£	s.	d.	£	s.	d.	
Consolidated.	Auctions - - - - -	18,190	7	5 ³ / ₄	15,712	12	11 ¹ / ₄	
	Beer - - - - -	80,810	2	6	56,188	15	7 ¹ / ₂	
	Bricks and tiles - - - - -	5,745	13	5	5,433	2	3 ¹ / ₂	
	Candles - - - - -	19,051	17	9	15,803	2	2	
	Cocoa nuts and coffee - - - - -	7,543	17	5 ¹ / ₂	7,343	17	5 ¹ / ₂	
	Cyder and perry - - - - -	2	7	3 ¹ / ₂	2	7	3 ¹ / ₂	
	Glas - - - - -	136,912	5	10 ¹ / ₂	40,852	10	5 ¹ / ₂	
	Hides and skins - - - - -	76,966	0	8 ¹ / ₂	66,323	18	6 ¹ / ₂	
	Hops - - - - -	25	14	2	25	14	2	
	Licences - - - - -	56,259	8	0 ¹ / ₂	47,981	1	5 ¹ / ₂	
	Malt - - - - -	36,828	10	1 ¹ / ₄	29,399	1	3 ¹ / ₂	
	Paper - - - - -	43,368	3	0 ¹ / ₂	27,075	11	10	
	Printed goods - - - - -	263,827	8	4 ¹ / ₂	72,446	12	4 ¹ / ₂	
	Salt - - - - -	117,112	9	5 ¹ / ₂	96,234	2	9 ¹ / ₂	
	Soap - - - - -	108,702	13	9 ¹ / ₂	90,099	6	1	
	British spirits - - - - -	288,879	15	4 ¹ / ₂	268,157	3	1 ³ / ₄	
	Foreign spirits - - - - -	125,669	8	1 ¹ / ₄	120,178	8	7 ¹ / ₄	
	Starch - - - - -	3,160	2	2 ¹ / ₂	1,478	9	9	
	Stone bottles - - - - -	6	9	4 ¹ / ₂	6	9	4 ¹ / ₂	
	Sweets - - - - -	257	2	0	257	2	0	
	Tobacco and snuff - - - - -	45,815	19	5 ¹ / ₂	42,299	5	6 ¹ / ₄	
	Vinegar - - - - -	794	18	5 ¹ / ₄	794	18	5 ¹ / ₄	
	Wine - - - - -	67,291	15	0 ¹ / ₂	58,213	7	11 ¹ / ₄	
	Temporary. Additional.	British spirits, 51 Geo. III. c. 59.	82	13	3 ¹ / ₂	82	13	3 ¹ / ₂
		Do. do. 52 Geo. III. c. 3.	86,327	12	9	83,027	12	9
		Foreign spirits, 51 Geo. III. c. 59.	494	4	6	494	4	6
		Do. do. 52 Geo. III. c. 3.	140	2	11 ³ / ₄	140	2	11 ³ / ₄
		Malt, 1803	65,148	14	3	50,523	5	2 ¹ / ₄
		British spirits, 1806	9,460	8	10 ¹ / ₄	7,610	9	6 ¹ / ₄
		Foreign spirits, 1803	62,002	15	11 ¹ / ₂	57,819	14	5 ¹ / ₂
		Do. do. 1807	899	3	3 ¹ / ₂	899	3	3 ¹ / ₂
		Sweets, 1803	42	17	0	42	17	0
Tobacco, 1806		37,108	13	0	34,345	5	3 ³ / ₄	
Fines and forfeitures	16,709	5	4 ³ / ₄	15,392	13	11 ³ / ₄		
Total, Excise		1,781,639	0	9 ¹ / ₄	1,312,685	3	10	
Annual.	Malt, 23d June: surplus	—	—	—	—	—	—	
	Do. deficient	29	7	5	584	19	6	
	Do. 1813	8,507	18	10	6,510	0	5	
	Do. 1814	583	7	7	583	7	7	
	Do. 25th March 1812, and preceding	110	12	5	87	6	2	
	Do. 1813	13,795	8	11	11,393	3	11	
	Do. 1814	923	8	2	923	8	11	
	Tobacco, ending 25th March 1813, and preceding	30,214	7	9	29,645	18	1	
	Do. 1814	25,887	12	4	25,787	10	10	
	Total, annual duties		80,052	3	5	74,345	15	8
Grand total		1,861,691	4	2 ¹ / ₄	1,387,030	19	6	

REVENUE.

An Account of the Grefs and Net Produce, &c. of the Duties arising from Stamps in England.

	Grefs Produce.			Net Produce.		
	£	s.	d.	£	s.	d.
Deeds, law proceedings, and other written instruments, (except legacy receipts, probates and administrations, bills of exchange, and promissory notes and receipts,) and on licences to pawn-brokers and dealers in thread lace	2,010,598	13	5 $\frac{3}{4}$	1,901,235	0	9
Legacies	545,115	6	3	525,134	17	2
Probates and administrations	417,263	5	2	402,576	0	3 $\frac{1}{4}$
Bills of exchange and promissory notes	624,353	17	5	602,542	9	5
Receipts	161,080	9	3	148,827	0	2 $\frac{3}{4}$
Newspapers and almanacs	394,041	0	4	329,069	17	1
Medicine and medicine licences	41,578	11	3 $\frac{1}{2}$	36,188	11	7 $\frac{1}{2}$
Fire insurances	437,380	18	6	405,844	2	1 $\frac{1}{2}$
Cards	24,462	5	0	23,788	9	1
Gold and silver plate	66,198	9	4 $\frac{1}{2}$	60,030	15	6 $\frac{3}{4}$
Dice	723	0	0	712	18	6
Pamphlets	415	13	8	410	0	10
Advertisements	114,111	12	10	110,348	9	9 $\frac{1}{2}$
Stage coaches	167,239	17	0 $\frac{3}{4}$	163,010	6	11 $\frac{3}{4}$
Post horfes	247,467	10	0	244,322	12	2
Race horfes	868	7	0	786	16	10 $\frac{1}{2}$
	5,252,898	16	7 $\frac{1}{2}$	4,954,828	8	5 $\frac{1}{2}$
Lottery	4,469	4	8	3,774	3	7

An Account of the Grefs and Net Produce, &c. of the Duties arising from Stamps in Scotland.

	Grefs Produce.			Net Produce.		
	£	s.	d.	£	s.	d.
Deeds, law proceedings, and other written instruments, (except legacy receipts, testamentary inventories, bills of exchange, and promissory notes and receipts,) and on licences to pawn-brokers and dealers in thread lace; also newspapers and almanacs	184,800	9	5 $\frac{1}{2}$	172,864	9	0 $\frac{1}{2}$
Legacies	26,186	0	2	24,800	0	0
Bills of exchange and promissory notes	95,543	4	1	91,069	13	10
Testamentary inventories	16,697	7	11	15,341	7	11
Receipts	11,569	9	11 $\frac{1}{2}$	10,872	9	11
Fire insurance	15,918	19	4	15,118	6	6
Gold and silver plate	3,425	17	5 $\frac{1}{4}$	3,139	11	4 $\frac{1}{2}$
Medicine and medicine licences	210	17	0	178	15	6
Advertisements	14,623	7	0	13,950	11	4
Stage coaches	11,732	10	3	11,427	2	9
Pamphlets	6	4	0	6	4	0
Race horfes	73	10	0	69	16	8
	380,787	16	7 $\frac{1}{4}$	358,838	12	6

REVENUE.

An Account of the Grefs and Net Produce, and Payments into the Exchequer, of the Revenue, under the Management of the Commissioners of Taxes in England and Wales, including the Property Tax.

Taxes.	Grefs Produce, 1813.			Net Produce.		
	£	s.	d.	£	s.	d.
Land tax - - - - -	1,272,256	16	3 $\frac{1}{4}$	1,127,078	8	3 $\frac{1}{2}$
Assessed taxes - - - - -	6,155,867	0	6	5,903,818	10	1 $\frac{1}{4}$
Property tax - - - - -	13,016,041	17	3 $\frac{3}{4}$	12,750,408	7	2
Aid and contribution tax - - - - -						
Income tax - - - - -	1,020	13	8	993	15	4 $\frac{1}{2}$
	20,445,186	7	9	19,782,299	0	11 $\frac{1}{4}$

An Account of the Grefs and Net Produce, and Payments into the Exchequer, of the Revenue, under the Management of the Commissioners of Taxes in Scotland.

Taxes.	Grefs Produce, 1813.			Net Produce.		
	£	s.	d.	£	s.	d.
Land tax - - - - -	31,143	1	1 $\frac{3}{4}$	18,700	0	0
Assessed taxes - - - - -	414,593	19	1 $\frac{1}{2}$	383,900	0	0
Property tax - - - - -	1,255,924	15	7 $\frac{1}{2}$	1,215,400	0	0
Aid and contribution tax - - - - -						
Income tax - - - - -	600	0	0	600	0	0
	1,702,261	15	10 $\frac{3}{4}$	1,618,600	0	0

An Account of the Grefs and Net Produce, and Payments into the Exchequer, of the Revenue arising from the Post-office in England and Scotland respectively.

		Grefs Produce.			Net Produce.		
		£	s.	d.	£	s.	d.
Inland - - - - -		1,532,980	12	11	1,136,027	2	3
Foreign - - - - -		128,647	14	10	42,456	18	5
Twopenny post - - - - -		93,299	15	5	57,675	19	3
Scotland - - - - -		191,884	15	6	154,094	5	11
Ireland - - - - -		59,236	18	8	29,962	2	10
Total - - - - -		2,006,049	17	4	1,420,216	8	8

An Account of the Grefs Receipt and Net Payments into the Exchequer, on the Duty of One Shilling in the Pound on Salaries and Pensions in England and Scotland respectively.

		Grefs Receipt, 1813.			Net Produce.			
		£	s.	d.	£	s.	d.	
England	}	London, Middlesex and Westminster	4,849	6	10	4,393	8	5 $\frac{1}{2}$
	}	Exchequer	11,828	17	8	12,331	13	0
			16,678	4	6	16,725	1	5 $\frac{1}{2}$
Scotland - - - - -			2,970	12	2	600	0	0
			19,648	16	8	17,325	1	5 $\frac{1}{2}$

REVENUE.

An Account of the Gross Receipt and Net Payments into the Exchequer, of the Duty of Sixpence in the Pound on Salaries and Penfions in England and Scotland respectively.

		Gross Receipt, 1813.	Net Produce.
		£ s. d.	£ s. d.
England	London, Middlesex and Westminster	3,750 8 10½	3,941 17 10¾
	Exchequer	5,928 11 0	6,365 11 3
		9,678 19 10½	10,307 9 1¾
Scotland		2,049 17 2	400 0 0
		11,728 17 0	10,707 9 1¾

An Account of the Gross Receipts, &c. of the Revenues arising from Hackney Coaches and Chairs.

Gross amount	{	in the year ending Jan. 5th, 1813	}	£ 25,181 10 0
Net produce				21,874 16 10½

An Account of the Gross Receipts, &c. of the Revenues arising from the Department of the Hawkers and Pedlars.

Gross amount	£ 20,160 3 2½
Net produce	17,581 11 11

An Account of the Gross and Net Produce, on account of Prefines.

Gross produce	£ 6,817 3 4
Net produce	3,669 15 4

An Account of the Gross and Net Produce arising from Post-Fines.

Gross produce	£ 516 13 9½
Net produce	458 1 3½

An Account of the Sums received by way of Lottery.

On account of Lotteries in 1812	£ 840,926 16 5
Do. do. 1813	95,000 0 0

An Account of the Total Sums of Money paid into the Exchequer, on account of Public Loans.

	£	s.	d.
Contributions to annuities in 1812, for raising 22,500,000 <i>l.</i>	651,367	4	2
Contributions by debentures in 1813, for raising 6,000,000 <i>l.</i>	540,773	11	11
Contributions by debentures in 1813, for raising a farther sum	245,924	7	0
Contributions to annuities in 1813, for raising 27,000,000 <i>l.</i>	25,900,000	7	0
Contributions to annuities in 1814, for raising 22,000,000 <i>l.</i>	7,712,509	14	8

An Account of the Amount of Exchequer Bills, issued for the Public Service.

Under what Acts issued.	On what Funds charged, and the total Amount to be issued under each Act.	Amount issued and not redeemed within the Year.
	£	£
52 Geo. III. c. 114.	Supplies - 1812	1,289,900
53 Geo. III. c. 16.	Supplies - 1814	4,248,300
53 Geo. III. c. 26.	Supplies - 1814	5,000,000
53 Geo. III. c. 27.	Supplies - 1814	1,500,000
53 Geo. III. c. 42.	Supplies - 1813	15,879,900
53 Geo. III. c. 118.	Supplies - 1814	5,670,700
53 Geo. III. c. 119.	Supplies - 1814	545,200
53 Geo. III. c. 161.	Supplies - 1814	4,358,000
54 Geo. III. c. 2.	Malt, &c. - 1814	2,862,000
		41,354,000

An Account of the Amount of Navy, Victualling, and Transport Bills.

	£	s.	d.
Navy - - - - -	1,535,380	0	3
Victualling - - - - -	1,250,947	1	11
Transport - - - - -	913,473	6	0
	3,699,740	8	2

An Account of the Charge upon the Consolidated Fund, distinguished under several Heads.

	£	s.	d.
Civil list { For the support of his majesty's household, per 17 G. III. -	898,000	0	0
{ Ditto - 44 G. III. -	60,000	0	0
{ Ditto - 52 G. III. -	70,000	0	0
Courts of justice - - - - -	69,692	3	0
Mint - - - - -	17,333	17	0
Salaries, Allowances, &c. - - -	12,833	13	4
Commissioners of public accounts -	45,465	14	4½
Commissioners of West India accounts - - - - -	9,656	6	11
Miscellaneous - - - - -	79,956	5	0
His royal highness the duke of Clarence, per 31 Geo. III. -	12,000	0	0
His royal highness the duke of York, per 32 Geo. III. -	14,000	0	0
Her royal highness the duchess of York, per 32 Geo. III. -	4,000	0	0
His royal highness the prince of Wales, per 35 Geo. III. -	65,000	0	0
His royal highness the duke of Kent, per 39 Geo. III. -	12,000	0	0
His royal highness the duke of Cumberland, per 39 Geo. III. -	12,000	0	0
His royal highness the duke of Sussex, per 42 Geo. III. -	12,000	0	0
His royal highness the duke of Cambridge, per 42 Geo. III. -	12,000	0	0
His royal highness the duke of Clarence, per 46 Geo. III. -	6,000	0	0
His royal highness the duke of Kent, per 46 Geo. III. -	6,000	0	0
His royal highness the duke of Cumberland, per 46 Geo. III. -	6,000	0	0
His royal highness the duke of Sussex, per 46 Geo. III. -	6,000	0	0
His royal highness the duke of Cambridge, per 46 Geo. III. -	6,000	0	0
Her royal highness the princess Charlotte of Wales, 46 G. III. -	7,000	0	0
His highness the duke of Gloucester, per 46 Geo. III. -	14,000	0	0
Her highness the princess Sophia of Gloucester, per 46 Geo. III. -	7,000	0	0
Her royal highness the princess Elizabeth, per 52 Geo. III. -	9,000	0	0
Her royal highness the princess Augusta Sophia, 52 G. III. -	9,000	0	0
Her royal highness the princess Mary, per 52 Geo. III. -	9,000	0	0
Her royal highness the princess Sophia, per 52 Geo. III. -	9,000	0	0
These, with other pensions, amount in the whole to -	1,595,350	6	11¾

For more particulars of this kind, see *POLITICAL Arithmetic, Public DEBTS, Public FUNDS, and TAX.*

REVENUE, *Auditors of the.* See AUDITOR.

REVENUE, *Court of.* See COURT of Exchequer.

REVENUE, *Officers of,* are excluded from voting in elections for members of parliament by 22 Geo. III.

REVENUE, *Revenu,* in *Hunting,* a fleshy mass or lump, formed chiefly of a cluster of whitish worms on the heads of deer, and supposed to occasion them to call their horns, by those worms gnawing the roots of them.

The revenue distilled, is said to help women in travail.

REVENUE is also used for a new tail of a partridge, growing out after the loss of a former. The revenue is measured by fingers; thus they say, a partridge of two, three, and four fingers revenue.

REVERA, in *Geography,* a small island in the Adriatic, near the coast of Istria. N. lat. 45° 15'. E. long. 13°.

REVERBERATION, REVERBERATIO, formed from *re,* and *verbero,* q. d. *I beat again,* in *Physics,* the act of a body repelling or reflecting another, after impinging on it. In the glass-men's furnace, the flame reverberates or bends back again to burn the matter on all sides. Echoes are occasioned by the reverberation of sounds from arched obliques.

Reverberation and refilition refer to the same action; only the one to the agent, the other to the patient. A polished body reverberates the rays all around; the refilition of the rays does not arise from their striking against the solid parts of bodies. See REFLECTION.

REVERBERATION, in *Chemistry,* denotes a kind of circulation of the flame, by means of a reverberatory; or the return of the flame from the top of the furnace back to the bottom, chiefly used in calcination.

Reverberation is of two kinds. The first with a *close fire*; that is, in a reverberatory furnace, where the flame has no vent at top; being covered with a dome, or capital, which repels its action back on the matter, or the vessel that contains it, with increased vehemence.

After this manner are refining, the distillation of acid spirits, &c. performed.

Reverberation with an *open fire,* is that performed in a furnace, or reverberatory, whose registers are all open; used in calcination, &c.

REVERBERATORY, or REVERBERATING *Furnace,* is a chemical furnace built close all round, and covered at the top with a capital of brick or tiles, so as not to give any vent to the heat or flame, but to determine it to reverberate or turn back from the brick-work with new force, upon the matters placed at bottom.

When the fire has no vent or passage at top, it is a *whole* reverberatory; when the middle of the capital is open, and only the sides close, so that there is only a half circulation of the flame, it is called a *half* reverberatory.

The reverberating furnace is chiefly used in the fusion and calcination of metals and minerals, and on other occasions, where the most intense heat is required, as in assaying, &c. Whence it is also called the *melting-furnace,* and *assaying furnace.* See *Reverberating FURNACE.*

REVERENCE, in *Ethics,* is the veneration, or high degree of respect, which is paid to superior sanctity, intermixed with a certain degree of awe. It is the high respect paid to the sacred character of its object, attended with a conscious inferiority in moral worth.

REVEREND, REVERENDUS, a title of respect given to ecclesiastics.

The religious abroad are called reverend fathers; and abbesses, prioresses, &c. are called reverend mothers.

With us, bishops are *right reverend*; and archbishops *most reverend*. In France, their bishops, archbishops, and abbots, are all alike *reverendissimes, most reverend*.

REVERIE, a term purely French, frequently used of late in English, to signify a delirium, raving, or distraction. It is an ill sign in fevers when the patient falls into a reverie.

Hence also reverie comes to be used for any ridiculous, extravagant imagination, action, or proposition, a chimera or vision. Thus we say, authors obtrude abundance of their reveries upon us for solid truths.

But the most ordinary use of the word reverie, among English writers, is for a deep, disorderly musing or meditation, equivalent to what we popularly call a *brozon study*. Thus, a little distraction I would allow; but for that continued series of reveries some people are guilty of who are ever absent from the place where you see them, and are never present any where, it is inexcusable.

REVERO, in *Geography*, a town of Italy, in the department of the Mincio, on the S. side of the Po, opposite to Ostiglio.

REVERS, BATTERY DE. See BATTERY.

REVERSAL, in *Law*. See REVERSE.

REVERSATA ARMA. See ARMA.

REVERSE, in the *Military Art*, signifies on the back, or behind. Thus we say, a reverse view, a reverse commanding ground, a reverse battery, &c.

REVERSE, formed of *re, again*, and *versus, turned*, in *Law*, &c. To reverse, signifies to undo, repeal, or make void.

A judgment may be reversed or voided for matters foreign to or *debors* the record, that is, not apparent upon the face of it, by writ of error, and by act of parliament. The effect of falsifying or reversing an outlawry is, that the party shall be in the same plight as if he had appeared upon the *capias*; and if it be before plea pleaded, he shall be put to plead to the indictment; if after conviction, he shall receive the sentence of the law; for all the other proceedings, except only the process of outlawry for his non-appearance, remain good and effectual as before. But when judgment, pronounced upon conviction, is falsified or reversed, all former proceedings are absolutely set aside, and the party stands as if he had never been at all accused; restored in his credit, his capacity, his blood, and his estates. But he still remains liable to another prosecution for the same offence. See ATTAINDER, JUDGMENT, and OUTLAWRY.

REVERSE of a medal, coin, &c. denotes the second, or back side; in opposition to the head or principal figure, called the face, or obverse.

F. Chamillart, a Jesuit, has an express dissertation on this point, whether or no the reverses of medals have always a regard to the emperors or empresses whose heads are represented on the front side of the medal? He says, that till of late the antiquaries have made no doubt of it; but that there are now several authors of another opinion.

The knowledge of the reverses of medals constitutes a distinguishing part of this science. In the early Greek coins, the reverse seldom affords much fancy of symbol; and in the imperial Greek coins it is chiefly impressed with temples of their deities. To Greek artists we are indebted for the beauty of the Roman imperial coins; and these are so highly finished, that on some reverses, as that of Nero's decurion, the "Adventus" and "Progressio" of various emperors, the "Fundator pacis" of Severus, the features of the emperor riding, or walking, are as exact as on the obverse. No Roman or Etruscan coins have been found of the globular form, or indented on the reverse, like the early Greek. The first

Greek are small pieces of silver, while the Roman are large masses of copper: the former are struck, the latter are cast in moulds. The reverses of Roman coins are very uniform, the prow of a ship, a car, or the like, till about 100 years before our era, when various reverses appear on their consular coins in all metals. See MEDAL.

With respect to the consular medals, it is observed, that the same reverse is common to many of them; as Castor and Pollux on horseback, first used; then a victory, or one of the gods; or the person to whose honour the medal was struck, driving a chariot with two or four horses; whence the denomination of the denarius *bigatus*, and *quadrigatus*. The ratis or ship, or prow of a ship, as an emblem of naval power, was no uncommon reverse on the consular coins; which were, on this account, called *rattii*. Some of the consular medals, that bore on the face the impress of their ancient kings, preserved on the reverse the record of some worthy action which they had performed, as the famous aqueduct on the reverse of Ancus, in honour of his having begun it. Medals, struck on occasion of founding colonies, have sometimes on the reverse a priest following a yoke of oxen, with a plough; designed to denote the manner in which the boundaries of colonies were marked out, or that they were planted by the common people; and those trophies that are sometimes seen on medals of this kind, signify that they were planted by the veteran soldiers.

The reverses of imperial medals are very various; but the chief of them may be reduced to three classes, *viz.* figures or personages; public monuments or buildings; and inscriptions. The figures are sometimes those of princes in miniature, whose portraits are exhibited more at large on the face; as on the reverses of the emperors of the family of Constantine, we often see the emperor standing with a labarum in his right hand, and a globe, surmounted with a victory, in his left. Sometimes the emperor is disguised under the figure of some god; as on the reverse of a Dioclesian, who had assumed the name Jovius, he appears in the figure of Jupiter, sitting in a chair, with a globe in his hand, surmounted with a Victory; the legend being *IOVI. N. U. C. C. i. e. Hoc voluerunt consules*. The Greek coins of cities present us with exquisite heads of deities, apparently copied from statues or paintings. The majesty of Jupiter, the modesty of Diana, the beauty of Venus, the ferocity of Mars, and other ideal characters, appear in the Grecian civic coins with a perfection not to be surpassed by human art. Sometimes the figure on the reverse is some relation of that on the face; as Augustus on the reverse of Julius, and Claudius on the reverse of his mother Antonia. Such medals are highly esteemed by antiquarians, not only because it is a rule with them that every coin stamped with portraits on either side is very valuable, but because they identify the personage on the reverse to have been the wife, the son, or the daughter of such a particular prince, and thus help in the adjustment of a series. The figure of some deity is sometimes seen on the reverse; as Minerva on the reverse of a Domitian; and the goddess Salus, with a patera in her hand, sacrificing to Esculapius, on the reverse of a Marcus Aurelius. (See MEDAL.) The virtues for which the emperors were, or wished to be, celebrated, are also frequently expressed by the figures on the reverses; and thus the fine personifications and symbols to be found on the reverses of the Roman coins render them entertaining, as well as instructive, to a person of poetical imagination. Virtue or Courage is represented by a bold armed woman with a spear in her right hand, and a parazonium in her left, on the reverse of a Domitian; Liberty, carrying in her right hand the cap of liberty, and in her left the wand called *rudis* or *vindicta*,

vindicta, appears on the reverse of a Commodus; and Equity, with a spear in her right hand, and a balance in her left, on the reverse of a Vespasian. The virtues of the ladies are also celebrated on the reverses of their medals; as Piety, in the habit of a Vestal virgin, strewing frankincense on an altar, on the reverse of a Faustina; Fœcunditas on another medal of the same, and SPES REIPUBLICÆ, expressed by a female figure, wearing a helmet to represent the republic, and two children at her breasts, on the reverse of a Maximiana Fausta, second wife of Constantine the Great. Happiness has sometimes the caduceus, or wand of Mercury, which Cicero (1 Offic.) tells us was thought to procure every wish. She has, in a gold coin of Severus, heads of poppy, to express that our chief bliss arises from oblivion of misfortune. Hope is represented as a sprightly damsel, walking quickly, and looking straight forwards. With her left hand she holds up her garments, that they may not impede the rapidity of her pace; while, in her right hand, she holds forth the bud of a flower, an emblem infinitely more fine than the trite one of an anchor, which is the symbol of patience, not of hope. This personification, with some others, must have been very familiar to the ancients, for often in this, and a few more instances, no name, as SPES AUG. or the like, is inserted in the legend. Abundance is imaged as a sedate matron, with a cornucopia in her hands, of which she scatters the fruits over the ground, nor does she hold up her cornucopia, and keep its contents to herself, as many modern poets and painters make her do. The emperor Titus, having cause to import a great supply of corn, during a scarcity at Rome, that supply, or the ANNONA, is finely represented as a sedate lady, with a full cornucopia in her left hand, which she holds upright, to indicate that she does not, however, mean to scatter it, as Abundance has a title to do, but to give it to Equity to deal out. This last circumstance is shewn by her holding a little image of Equity, known by her scales, and *hæsta pura*, or pointlefs spear, in her right hand, over a basket filled with wheat. Behind the ANNONA is the prow of a ship, decked with flowers, to imply that the corn was brought by sea, (from Africa,) and that the ships had had a prosperous voyage. The best poet in the world could not have given us a finer train of imagery; and the best painter would be puzzled to express so much matter in so small a compass. Security stands leaning on a pillar, indicative of her being free from all designs and pursuits; and the posture itself corresponds to her name. Horace, in describing the wise man, mentions his being “*teres atque rotundus*,” round and polished against all the rubs of chance;—an image seemingly derived from the column upon which this ideal lady reclines. The happiness of the state is pictured by a ship, sailing before a prosperous breeze;—an image, than which the superlative genius of Gray could not have found one more exquisite; and he has accordingly used it in his most capital production, “*The Bard*,” with due success.

Provinces are also represented by figures or personages, denoting either the emperor's conquest or care of them; as Judæa sitting in a melancholy posture at the bottom of a pillar adorned with trophies, to signify her captive state, on the reverse of a Vespasian; and Italia with a cornucopia in her right hand, to denote her fruitfulness; a crown of towers on her head, to represent her many cities; a sceptre in her left hand, and sitting on a globe, to shew that she was sovereign of nations, on the reverse of a Commodus. Britain is often represented, upon the earliest imperial coins, sitting on a globe, with a symbol of military power, the *labarum*, in her hand, and the ocean rolling under her feet;—an emblem almost prophetic of the vast power which her dominion over the sea will always give her, provided that

she asserts her element of empire with due vigour and perseverance, blending moderation and justice with her mighty power. On coins also we are presented with Achaia, Africa, Alamannia, Alexandria, Arabia, Armenia, Asia, Bithynia, Cappadocia, Dacia, Dardania, Egypt, Gallia, Hispania, Italia, Judæa, Macedonia, Mauritania, Pannonia, Parthia, Phrygia, Sarmatia, Sicily, Scythia, Syria, and the rivers Danube, Nile, Rhine, and Tiber. This personification of provinces, so interesting to the imagination, seems to have arisen from the figures of provinces carried in triumphs; as the personification of our old poets sprung from the ideal persons, actually represented in the mystical plays. Whilst we are on the subject of the poetical imagery of ancient coins, we must not omit the mention, even, of a colonial one and of rude execution, of Augustus and Agrippa, inscribed IMP. and DIVI F. which has a high claim to merit in this way. On the reverse the conquest of Egypt is represented by the apposite metaphor of the crocodile, an animal almost peculiar to that country, and at that period esteemed altogether so, which is chained to a palm-tree, at once a native of the country and symbolic of victory. Moreover, the figure on the reverse is sometimes designed to immortalize some worthy action of the emperor; as the goddess Moneta, with a cornucopia in her left hand, and a balance in her right, on the reverse of a Domitian, to denote his care about the public coin. There are sometimes two, three, or more figures, on the same reverse; as Honos and Virtus on the reverse of Galba; and three kings, with the emperor crowning them, on a medal of Trajan. (See MEDAL.) There are also the figures of animals on the reverses of some medals; as the eagle and peacock, to denote the apotheosis of princes and princesses; the crocodile, as the symbol of Egypt; a serpent, of Esculapius; a camel, of Arabia, &c.; and elephants in trappings on the reverse of an Antoninus Pius and a Severus, importing that these emperors procured these beasts to entertain the people at the public shows. We meet also with fabulous animals, as the griffin on the reverse of one medal of Gallienus, a centaur on another, and a phoenix on some medals of Constantine and his sons, denoting the perpetuity of the empire.

The second sort of reverses comprehends public monuments and buildings; as the temple of Janus shut, on the reverse of a Nero, to signify the universal peace he gave to the empire; the Macellum, or shambles, which he caused to be erected, on another; the sumptuous bridge built by Trajan over the Tiber, on the reverse of one of his medals; and the Amphitheatre and Naval Column, on those of Titus.

The third sort of reverses includes inscriptions on the table or field of the medal. On several Latin and Greek imperial medals, we find nothing on the reverse but S. C. or Δ. Ε. for *δημαρχικὸς ἐξουσις*, inclosed in a crown. Others represent signal occurrences; as VICTORIA GERMANICA IMP. VI. COS. III. on the reverse of M. Aurelius. Others have titles of honour granted to the princes; as S. P. Q. R. OPTIMO PRINCIPI, on the reverse of a Trajan, and also of an Antoninus Pius. Other inscriptions again have respect to public vows, which were made for the emperor every ten years, or sometimes, in the lower empire, every five years. Thus we have on the reverse of a Constantius VOTIS XXX. MULTIS XXXX. importing probably their engagement to make new vows at the expiration of thirty years, that he might reign forty years.

Besides the reverses already enumerated, there are others, called by Addison riddles, which cannot be referred to any of the above classes. Thus, Mercury in the form of a Terminus, standing on a thunder-bolt, on the reverse of

an Augustus, was probably intended for a rebus, to express the sense of that emperor's motto, *festina lente*. Instruments of religion were symbols of the pontifex maximus, and signified the piety of the prince, on whose coin they appear; as the lituus, the simpulum, the asperforium, and the capula, on the reverse of a Nerva. Two hands joined, holding two ears of corn, and a caduceus betwixt them, on the reverse of a Titus, import the good harmony and union subsisting betwixt the prince and the public, the peace arising from such an union, and the plenty, which is the fruit of such a peace. Pinkerton on Medals, 2 vols. Addison's Three Series of Medals, in his Works, vol. i. p. 522, &c. See MEDALS.

REVERSE, in *Fencing*, a back-stroke.

REVERSED, in *Heraldry*, a thing turned backwards, or upside down.

REVERSED *Arms*, in *Military Language*, denote those whose butts are slung or held upwards.

REVERSED *Talon*, in *Architecture*. See TALON.

REVERSING, or RENVERSING, in *Music*, the inverting of the order of the parts; that is, placing the higher part, or treble, in the room of the lower part or bass.

Reversing is frequently practised in figurative counterpoint, where the bass serves as treble, and the treble at the same time as bass; and all this in such manner, as that the harmony, though very different, is yet as correct as before the reversing, when the parts were in their natural order.

A reversed fugue, or counter-fugue, called by the Italians *per contrarii movementi*, is when the guida falls, and the other, instead of imitating by falling, imitates by rising; or, it is a figure *per arsin et thesin*. See RENVERSÉ.

REVERSION, RENVERSIO, in *Law*, is defined by Coke, a returning of lands, &c. into the possession of the donor or his heirs, after the expiration of the term for which they were given or granted to another. Or, an estate in reversion, is the residue of an estate left in the grantor, to commence in possession after the determination of some particular estate granted out by him.

The word has a double acceptance. The first is, *jus revertendi, cum status possessionis defecerit*; which is no more than an interest in the land, when the occupation or possession of it shall fall.

The second is, when the possession and estate, which was parted with for a time, ceaseth, and is determined in the person of the alienees, assignees, grantees, or their heirs, or effectually returns to the donor, his heirs or assigns, whence it was derived.

This is the most proper signification of the word, which is derived from *revertor*: "Et apte dici non potest reversionio, antequam revertatur in factu." Littlel.

The difference between a reversion and a remainder consists in this, that a remainder is general, and may remain or belong to any man but him that granteth or conveyeth the land, &c.

Whereas a reversion is to himself, from whom the conveyance of the land, &c. proceeded, and is commonly perpetual as to his heirs also. And yet sometimes reversion is confounded with remainder.

A reversion is never created by deed or writing, but arises from construction of law; a remainder can never be limited, unless by either deed or devise. But both are equally transferrable, when actually vested, being both estates *in presenti*, though taking effect *in futuro*. The usual incidents to reversions, the doctrine of which is derived from the feudal constitution, are said to be fealty and rent. When no rent is reserved on the particular estate, fealty however results of course, as an incident quite inseparable, and may be demanded as a badge of tenure, or acknowledg-

ment of superiority, being frequently the only evidence that the lands are holden at all. Where rent is reserved, it is also incident, though not inseparably so, to the reversion. (Co. Litt. 143.) The rent may be granted away, reserving the reversion; and the reversion may be granted away, reserving the rent, by special words; but by a general grant of the reversion, the rent will pass with it, as incident to it; though by the grant of the rent generally, the reversion will not pass. The incident passes by the grant of the principal, but not *e converso*; for the maxim of law is, *accessorium non ducit, sed sequitur, suum principale*. Co. Litt. 151, 152.

The law has carefully distinguished remainders from reversions. Thus, if one seized of a paternal estate in fee makes a lease for life, with remainder to himself and his heirs, this is properly a mere reversion (Cro. Eliz. 321.), to which rent and fealty shall be incident; and which shall only descend to the heirs of his father's blood, and not to his heirs general, as a remainder limited to him by a third person would have done (3 Lev. 407.); for it is the old estate, which was originally in him, and never yet was out of him. And so, likewise, if a man grants a lease for life to A, reserving rent with reversion to B and his heirs, B hath a remainder descendible to his heirs general, and not a reversion to which the rent is incident; but the grantor shall be entitled to the rent during the continuance of A's estate. 1 And. 23.

For the assistance of those who have an estate in remainder, reversion, or expectancy, after the death of others, against fraudulent concealments of their deaths, it is enacted by 6 Ann. c. 18. that all persons, on whose lives any lands or tenements are holden, shall (upon application to the court of chancery and order made thereupon) once in every year, if required, be produced to the court or its commissioners; or, upon neglect or refusal, they shall be taken to be actually dead, and the person entitled to such expectant estate may enter upon and hold the lands and tenements, till the party shall appear to be living.

It may further be observed, that whenever a greater estate and a less coincide and meet in one and the same person, without any intermediate estate, the less is immediately annihilated; or, in the law phrase, is said to be *merged*, that is, sunk or drowned in the greater. Thus, if there be tenant for years, and the reversion in fee-simple descends to or is purchased by him, the term of years is merged in the inheritance, and shall never exist any more. But they must come to one and the same person in one and the same right; else, if the freehold be in his own right, and he has a term in right of another (*en autre droit*), there is no merger. Therefore, if tenant for years dies, and makes him who hath the reversion in fee his executor, whereby the term of years vests also in him, the term shall not merge; for he hath the fee in his own right, and the term of years in the right of the testator, and subject to his debts and legacies. So also, if he who hath the reversion in fee marries the tenant for years, there is no merger; for he hath the inheritance in his own right, the lease in the right of his wife. An estate-tail is an exception to this rule: for a man may have in his own right both an estate-tail and a reversion in the fee; and the estate-tail, though a less estate, shall not merge in the fee. For estate-tails are protected and preserved from merger by the operation and construction, though not by the express words, of the statute *de donis*: which operation and construction have probably arisen upon this consideration; that, in the common cases of merger of estates for life or years by uniting with the inheritance, the particular tenant hath the sole interest in them, and hath full power at any time

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to defeat, destroy, or surrender them to him that hath the reversion; therefore, when such an estate unites with the reversion in fee, the law considers it in the light of a virtual surrender of the inferior estate. But in an estate-tail the case is otherwise: the tenant for a long time had no power at all over it, so as to bar or to destroy it; and now can only do it by certain special modes, by a fine, a recovery, and the like: it would, therefore, have been strangely improvident, to have permitted the tenant in tail, by purchasing the reversion in fee, to merge his particular estate, and defeat the inheritance of his issue: and hence it has become a maxim, that a tenancy in tail, which cannot be surrendered, cannot also be merged in the fee. Blackst. Comm. b. ii.

REVERSION of Series, in Algebra, is the method of finding the value of an unknown quantity, whose powers enter the terms of a finite or infinite series, by means of another series, in which it does not enter. Thus, if we have

$$y = ax + bx^2 + cx^3 + dx^4 + \&c. \text{ or}$$

$$y = ax^m + bx^{m+p} + cx^{m+2p} + dx^{m+3p} + \&c.$$

or if we have

$$\alpha y + \beta y^2 + \gamma y^3 + \delta y^4 + \&c. =$$

$$ax + bx^2 + cx^3 + dx^4 + \&c.$$

and we can find in these, and other similar cases,

$$x = Ay + By^2 + Cy^3 + Dy^4 + \&c.$$

the original series is said to be reverted. The reversion of series was first proposed by Newton, in a letter to Mr. Oldenbrough, at that time secretary to the Royal Society, with directions to have it communicated to Leibnitz, and

$$y = \left\{ \begin{array}{l} aAy + aB \\ + bA^2 \end{array} \right\} y^2 + \left\{ \begin{array}{l} aC \\ + 2bAB \\ + CA^3 \end{array} \right\} y^3 + \left\{ \begin{array}{l} aD \\ + 2bAC \\ + bB^2 \\ + 3cA^2B \\ dA^4 \end{array} \right\} y^4 + \left\{ \begin{array}{l} aE \\ + 2bad \\ + 2bBC \\ + 3cA^2C \\ + 3cAB^2 \\ + 4dA^3B \\ + cA^5 \end{array} \right\} y^5 + \&c.$$

Consequently we have $aA = 1$, and each of the other co-efficients equal to zero, it being a known property of two identical functions, that the co-efficients of the like powers of the indeterminate quantity are equal to each other; and since, on the first side of the above expression, y enters only simply, it follows, that all the powers of y on the other side must have their co-efficients equal to zero.

Whence we have

$$aA = 1$$

$$aB + bA^2 = 0$$

$$aC + 2bAB + CA^3 = 0$$

$$aD + 2bAC + bB^2 + 3cA^2B + dA^4 = 0$$

$$\&c. \qquad \qquad \qquad \&c.$$

and hence, again, we have

$$A = \frac{1}{a}$$

$$B = -\frac{b}{a^3}$$

$$C = \frac{2b^2 - ac}{a^5}$$

$$D = -\frac{5b^3 - 5abc + a^2d}{a^7}$$

$$E = \frac{14b^4 - 21ab^2c + 3a^2c^2 + ba^2bd - a^4e}{a^9}$$

$$\&c. \qquad \qquad \qquad \&c.$$

in which the author gave one of the earliest proofs of his great analytical powers. It was afterwards published in his "Analyfis per Equationes Numero terminorum Infinitas," and has since engaged the attention of many of the most profound analysts; and accordingly different methods have been suggested for this purpose; but that of M. Arbogast, in his "Calcul des Derivations," is the most complete. We have already, under the article *Calculus of DERIVATIONS*, explained, as far as was consistent with the plan of this work, the nature of the symbols, notation, and principles of this doctrine; and we may, therefore, under the present article, give that author's formulæ for reversion, referring the reader for the first principles to the article above-mentioned. Still, however, as many of our readers would probably wish to see the same in its plainer English dress, we propose, in the first instance, to shew the methods commonly employed for this purpose by our own algebraists. This consists in assuming a series of a *proper form* for the required unknown quantity, and then substituting the powers of this series, instead of the powers of that quantity, in the proposed series, and finally equating the co-efficients, whereby the values of the indeterminate or unknown co-efficients, above represented by A, B, C, D, &c. will be obtained.

Let $y = ax + bx^2 + cx^3 + dx^4 + ex^5 + \&c.$ be the proposed series, and

$$x = Ay + By^2 + Cy^3 + Dy^4 + Ey^5 + \&c.$$

the assumed reverted series; then, by substituting the several powers of this series, instead of the powers of x in that proposed, we have

And since $a, b, c, d, \&c.$ are known in the original series, the numeral values of A, B, C, D, &c. in the reverted series are thus determined.

With regard to the *proper form* of the assumed series, we may observe, generally, that in order to find the first term of the reverted series, the rule is, to substitute y^n instead of x in the proposed series, and to equate the least power of y arising from this substitution with unity, which will give the required value of n ; and as for the indices of the other powers they will be the same multiples of the above value of n , as they are (in the original series) of *unity*.

Let there be proposed, for example,

$$z = x^m + bx^{m+p} + cx^{m+2p} + dx^{m+3p}, \&c.$$

Here, in order to determine the form of the series to be assumed, let z^n be wrote for x in the given equation, according to the usual method; and then the exponents, supposing z transposed, will be $1, nm, nm + np, nm + 2np, nm + 3np, \&c.$ respectively; of which, the two least (1 and nm) being made equal to each other, n is found $= \frac{1}{m}$; and

the differences are $\frac{p}{m}, \frac{2p}{m}, \frac{3p}{m}, \&c.$ Whence the series

to be assumed is

$$z = z^{\frac{1}{m}} + B z^{\frac{1+p}{m}} + C z^{\frac{1+2p}{m}} + D z^{\frac{1+3p}{m}} + \&c.$$

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(for it is evident, by inspection, that the co-efficient (A) of the first term must here be an unit).

This series being therefore raised to the several powers of x , in the given equation, and the co-efficients of the homologous terms in the new equation compared together, it will be found that,

$$B = -\frac{b}{m}$$

$$C = -\frac{(1+m+2p)b^2-2mc}{2m^2}$$

$$D = -\frac{(2m^2+9mp+9p^2+3m+6p+1)b^3+}{6m^3}$$

$$\frac{(1+m+3p)bc}{m^2} - \frac{d}{m}, \text{ \&c.}$$

From the general value of x , found above, innumerable theorems, for reverting particular forms of serieses, may be deduced.

Thus, if $x + bx^2 + cx^3 + dx^4 \text{ \&c.} = z$; then (m being $= 1$, and $p = 1$) x is $= z - bz + (2bb - c)x^3 - (5b^3 - 5bc + d)x^5 \text{ \&c.}$

And, if $x + bx^2 + cx^3 + dx^4 \text{ \&c.} = z$; (m being $= 1$, and $p = 2$) $x = z - bz^2 + (3bb - c)x^3 - (12b^3 - 8cb + d)x^5 \text{ \&c.}$

Also, if $x^2 + bx^3 + cx^4 + dx^5 \text{ \&c.} = z$; then (m being $= \frac{1}{2}$, and $p = 1$) $x = z^2 - 2bz^3 + (7bb - 2b)x^5 - (30b^3 - 18bc + 2d)x^7 \text{ \&c.}$

It may be observed, that in all these forms of serieses, the first term is without a co-efficient (which renders the conclusion much more simple). Therefore, when the series to be reverted has a co-efficient in its first term, the whole equation must be first divided thereby. Thus, if the equation was $3x - 6x^2 + 8x^3 - 13x^4 \text{ \&c.} = y$; by dividing the whole by 3 it will become $x - 2x^2 + \frac{8x^3}{3} - \frac{13x^4}{3} \text{ \&c.}$

$= \frac{1}{3}y$; where, putting $z = \frac{1}{3}y$, we have, by For 1. $x = z + 2z^2 + \frac{16}{3}z^3 \text{ \&c.} = \frac{y}{3} + \frac{2y^2}{9} + \frac{16y^3}{81} \text{ \&c.}$

When there are two series, consisting of like powers of x and y , as

$$ax + bx^2 + cx^3 + \text{ \&c.} = \alpha y + \beta y^2 + \gamma y^3 + \text{ \&c.}$$

assume, as in the preceding cases,

$$x = Ay + By^2 + Cy^3 + Dy^4 + \text{ \&c.}$$

and let his, and its powers, be substituted for x , and the powers of x , and we shall have

$$\alpha y + \beta y^2 + \gamma y^3 + \delta y^4 + \text{ \&c.} = \left. \begin{array}{l} aAy + aB \\ \cdot bA^2 \end{array} \right\} y^2 + \left. \begin{array}{l} aC \\ + 2bAB \end{array} \right\} y^3 + \left. \begin{array}{l} aD \\ + 2bAC \\ + bB^2 \\ + 3cA^2B \\ + dA^3 \end{array} \right\} y^4 + \text{ \&c.}$$

in which, instead of equating all our co-efficients to zero, they must now be equated to $\alpha, \beta, \gamma, \delta, \text{ \&c.}$; that is

$$\begin{array}{l} aA = \alpha \\ aB + bA^2 = \beta \\ aC + 2bAB + cA^3 = \gamma \\ aD + 2bAC + bB^2 + 3cA^2B + dA^3 = \delta \\ \text{ \&c.} \qquad \qquad \qquad \text{ \&c.} \end{array}$$

Whence we have the following values of $A, B, C, D, \text{ \&c.}$ viz.

$$A = \frac{\alpha}{a}$$

$$B = \frac{\beta - bA^2}{a}$$

$$C = \frac{\gamma - 2bAB - cA^3}{a}$$

$$D = \frac{\delta - bB^2 - 2bAC - 3cA^2B - dA^4}{a}$$

$$E = \frac{-2bBC - 2bAD - 3cAB^2 - 3cA^2C - 4dA^3B - eA^5}{4a}$$

whence the values of $A, B, C, D, \text{ \&c.}$ become determined as before.

In all the above cases, the several co-efficients $a, b, c, d, \text{ \&c.}$ are conceived to be totally independent of each other, and when this is the case, that is, when no specific law obtains between them, it is obvious, that we can proceed no farther in the practical solution than we have derived terms in the theoretical investigation; but if, as most commonly happens, the series we are desirous of reverting arise from the expansion of any function, so that an uniform law is observed between its several co-efficients; a similar law may frequently be discovered in the reverted series, though this generally depends rather upon an induction than from any peculiar form under which the reverted co-efficients arise, which is indeed the great imperfection of this method of reversion.

Let us take, for example, the series

$$x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5} \text{ \&c.} = z,$$

to find the value of x in terms of z .

This agrees with our first form; where $a = 1, b = \frac{1}{2}, c = \frac{1}{3}, d = \frac{1}{4}, \text{ \&c.}$ and we have

$$\frac{1}{a} = 1$$

$$-b = -\frac{1}{2}$$

$$+ (2b^2 - ac) = \frac{1}{2} = \frac{1}{3} = \frac{1}{6} = \frac{1}{2 \cdot 3}$$

$$- (5b^3 - 5abc + a^2d) = \frac{1}{24} = \frac{1}{2 \cdot 3 \cdot 4}$$

$$+ (14b^4 - 21ab^2c + 3a^2c^2 + 6a^2bd - a^3e) = \frac{1}{120}$$

$$= \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}$$

And hence, inferring the same law to have place throughout, we have

$$x = z - \frac{1}{2}z^2 + \frac{1}{2 \cdot 3}z^3 - \frac{1}{2 \cdot 3 \cdot 4}z^4 + \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}z^5 - \text{ \&c.}$$

We must not, however, look for the like uniformity of result in all cases. As an example of the contrary, let there be proposed the series

$$x - \frac{1}{2}x^2 + \frac{1}{2 \cdot 3}x^3 - \frac{1}{2 \cdot 3 \cdot 4}x^4 + \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}x^5 - \text{ \&c.}$$

$$= \frac{1}{2}y + \frac{1}{3}y^2 + \frac{1}{4}y^3 + \frac{1}{5}y^4 + \frac{1}{6}y^5 + \text{ \&c.}$$

to find x in terms of y .

Here

Here $a = 1, b = \frac{1}{2}, c = \frac{1}{2 \cdot 3}, d = \frac{1}{2 \cdot 3 \cdot 4}, \&c.$

$\alpha = \frac{1}{2}, \beta = \frac{1}{3}, \gamma = \frac{1}{4}, \delta = \frac{1}{5}, \&c.$

whence

$$\frac{\alpha}{a} = \frac{1}{2} = A$$

$$\frac{\beta - b A^2}{a} = \frac{11}{24} = B$$

$$\frac{\gamma - 2 b A B - c A^3}{a} = \frac{11}{24} = C$$

$$\frac{\delta - b B^2 - 2 b A C - 3 c A^2 B - d A^4}{a} = \frac{1381}{2880} = D$$

$$\frac{\epsilon - 2 b B C - 2 b A D - 3 c A B^2 - \&c.}{a} = \frac{1543}{3840} = E$$

whence the proposed series is

$$x = \frac{1}{2} y + \frac{11}{24} y^2 + \frac{11}{24} y^3 + \frac{1381}{2880} y^4 + \frac{1543}{3840} y^5 + \&c.$$

in which no law of continuation can be discovered, either by induction, or otherwise.

In this respect the symbols and notation of Arbogast have a decided advantage, as by these means the law of formation in the reverted series is exhibited in the clearest possible point of view. Taking for example our first series, under the form

$$y = \beta x + \gamma x^2 + \delta x^3 + \epsilon x^4 + \&c.$$

to find $x = b y + c y^2 + d y^3 + e y^4 + \&c.$

Here the general result is expressed by

$$x = \beta^{-1} y + \frac{1}{2} \cdot D \cdot \beta^{-2} \cdot y^2 + \frac{1}{3} \frac{D^2}{C} \cdot \beta^{-3} \cdot y^3 + \frac{1}{4} \frac{D^3}{C} \cdot \beta^{-4} \cdot y^4 + \&c.$$

where the law is clearly expressed by means of the symbol D; and if it be requisite, the co-efficients may be easily expressed in terms of $\beta, \gamma, \delta, \&c.$ thus $\beta^{-1} = \beta^{-1}$.

$$\frac{1}{2} D \cdot \beta^{-2} = -\beta^{-3} \gamma = \frac{-\gamma}{\beta^3}$$

$$\begin{aligned} \frac{1}{3} \cdot \frac{D^2}{C} \cdot \beta^{-3} &= \frac{1}{3 \cdot 2} \cdot D (-3 \beta^{-4} \cdot \gamma) \\ &= \frac{1}{3 \cdot 2} (-3 \cdot -4 \beta^{-5} \cdot \gamma^2 - 3 \beta^{-4} \cdot 2 \delta) \\ &= 2 \beta^{-5} \cdot \gamma^2 - \beta^{-4} \cdot \delta = \frac{2 \gamma^2 - \beta \delta}{\beta^5} \end{aligned}$$

$$\begin{aligned} \frac{1}{4} \cdot \frac{D^3}{C} \cdot \beta^{-4} &= \frac{1}{4} (D \beta^{-4} \cdot \frac{D^2}{C} \cdot \gamma + \frac{D^3}{C} \cdot \beta^{-4} \cdot D \cdot \gamma^2 \\ &\quad + \frac{D^3}{C} \cdot \beta^{-5} \cdot \gamma^3) \\ &= \frac{1}{4} (4 \beta^{-5} \cdot \epsilon + \frac{4 \cdot 5}{1 \cdot 2} \beta^{-5} \cdot 2 \gamma \delta \\ &\quad - \frac{4 \cdot 5 \cdot 6}{1 \cdot 2 \cdot 3} \beta^{-7} \cdot \gamma^3) \\ &= \frac{5 \beta \gamma \delta - 5 \gamma^3 - \beta^2 \epsilon}{\beta^7} \end{aligned}$$

which will be found to agree with our former result.

We refer the reader who may not be acquainted with the use and signification of the above symbols and notation, to our article DERIVATIONS.

In these formulæ the quantities $\beta, \gamma, \delta, \&c.$ although totally independent, are yet apparently connected by means of the symbol of derivation D; but the application is generally made to series which express the evolution of some function, and the co-efficients of which series are consequently formed after a certain law: for instance

$$1 + x + \frac{x^2}{1 \cdot 2} + \frac{x^3}{1 \cdot 2 \cdot 3} + \&c.$$

is the evolution of e^x , and if y be put

$$= 1 + x + \frac{x^2}{1 \cdot 2} + \frac{x^3}{1 \cdot 2 \cdot 3} + \&c.$$

then, by the theorem for reversion,

$$x = \beta^{-1} (y - 1) + \frac{1}{2} D \cdot \beta^{-2} \cdot (y - 1)^2 + \frac{1}{3} \frac{D^2}{C} \cdot \beta^{-3} \cdot (y - 1)^3 + \&c.$$

but in the proposed form

$$\beta = 1 \cdot D \cdot \beta = \frac{1}{1 \cdot 2} \cdot \frac{D^2}{C} \cdot \beta = \frac{1}{1 \cdot 2 \cdot 3}, \&c.$$

$$\text{therefore } x = (y - 1) - \frac{1}{2} (y - 1)^2 + \frac{1}{3} (y - 1)^3 - \&c.$$

And in the same way from reversion, if

$$z = x + \frac{x^2}{2 \cdot 3} + \frac{3 x^3}{5 \cdot 8} + \&c.$$

$$\text{by reversion } x = z - \frac{z^2}{1 \cdot 2 \cdot 3} + \frac{z^3}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5} - \&c.$$

We refer the reader for more on this subject to Woodhouse's "Principles of Analytical Calculation," and Arbogast's "Calcul des Derivations;" and for the principles of the method stated in the former part of this article, to Simpson's "Fluxions," vol. ii. p. 302; Maclaurin's Algebra, p. 263. See also Newton's "Analysis per Equationes," and Bonnycastle's Algebra, vols. i. and ii.

REVERSIONS, in the *Doctrine of Annuities*, are either contingent or absolute. (For the former see the article SURVIVORSHIPS.) Of absolute reversions, the cases are very few, and the solutions simple and easy. An *absolute* reversion, whether it is to take place after the extinction of a single life, or of any number of lives, or after the expiration of a given number of years, must necessarily be more valuable, in general, than a *contingent* reversion; which, depending on events altogether uncertain, will be of less value in proportion as those events are less probable. The following problems include the principal cases of absolute reversions, and their solutions being almost self-evident, require no explanation.

PROBLEM I.

To find the value of the reversion in fee of an annuity after a given number of years.

Solution.—Deduct the value of an annuity for the given term from the perpetuity; multiply the remainder into the annuity, and the product will be the value required.

Example.—Let the annuity be 15*l.* the term 15 years, and the rate of interest 4 *per cent.* By Tab. III. (see ANNUITIES) the value of an annuity for 15 years is 11.118, which being deducted from 25 (the perpetuity), the remainder, or 13.882, multiplied into 15 (the given annuity),

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nunity), produces 208.23*l.* or 208*l.* 4*s.* 7*d.* nearly for the value required.

Corollary.—In like manner, the value of an annuity for a given term of years, after the expiration of another term, may be obtained by subtracting the value for the present term from the value during the present and reversionary terms: thus, the value of an annuity of 10*l.* during 15 years, after the expiration of 12 years, is found by subtracting 9.385 (the value for 12 years at 4*l. per cent.* by Tab. III. ANNUITIES) from 16.329 (the value by the same table for 27 years), and multiplying 6.944, the difference, into 10; which produces 69.44*cl.* or 69*l.* 8*s.* 10*d.* nearly for the value required.

PROB. II.

To find the value of the reversion in fee of an estate, or annuity, after the extinction of a given life.

Solution.—Deduct the value of an annuity on the given life from the perpetuity; multiply the remainder into the annual produce of the estate, or into the annuity, and the product will give the value sought.

Example.—Let the annual produce of the estate or annuity be 18*l.* the age of the possessor of such estate or annuity 35, and the rate of interest 3*l. per cent.* By Tab. VI. (LIFE-ANNUITIES), the value of an annuity on a life of 35, at 3*l. per cent.* is 15.938. The perpetuity, at the same rate, is 33.333; the difference between these two values, or 17.395, multiplied into 18, produces 313.110*l.* or 313*l.* 2*s.* 2*d.* for the answer.

Corollary.—The reversion in fee after two or three joint lives, or after the longest of two or three lives, is found in the same manner, by deducting the values of those lives from the perpetuity. Thus the value of two joint lives, aged 30 and 35, by Tab. VIII. (LIFE-ANNUITIES), at 3*l. per cent.* is 12.131, which being deducted from 33.333, and multiplied into 5, will give 106.01*l.* or 106*l.* 0*s.* 2*d.* for the value of the reversion in fee of an estate of 5*l. per annum* after the extinction of those joint lives. In like manner, the value of the reversion in fee of an estate of 10*l. per annum*, after three joint lives, aged 30, 35, and 40 years, and computing at 4 *per cent.* may be found by Prob. IV. (LIFE-ANNUITIES) to be 163.81*l.* or 163*l.* 16*s.* 2*d.*; and after the longest of those three lives, it may be found by Prob. V. (LIFE ANNUITIES) to be 59.980*l.* or 59*l.* 19*s.* 7*d.* nearly.

PROB. III.

To find the value of a given sum, payable on the extinction of a given life.

Solution.—Deduct, as in the preceding problem, the value of an annuity on the given life from the perpetuity; multiply the remainder by the given sum, and divide the product by the perpetuity increased by unity; the quotient will be the answer.

Example.—Let the sum be 1000*l.* the age of the given life 45 years, and the rate of interest 5*l. per cent.* By Tab. VI. (LIFE-ANNUITIES), the value of an annuity, on a life of 45, at 5 *per cent.* is 11.105, which being deducted from 20, the perpetuity, leaves 8.895. This remainder, multiplied into 1000, and divided by 21, gives 423.571*l.* or 423*l.* 11*s.* 5*d.* for the value required.

In the same manner may be found the value of a given sum, payable on the extinction of two or three joint lives, or of the longest of two or three lives. Thus, the value of two joint lives, of 40 and 50, at 4 *per cent.* by Tab. IX. (LIFE-ANNUITIES), being 8.834; the difference between this value and 25, the perpetuity, will be 16.166; which being multiplied into 1000, and the product divided by 26, will give

621.77*l.* or 621*l.* 15*s.* 5*d.* for the present value of 1000*l.* payable on the extinction of those joint lives. Again, by the rule in the article on LIFE-ANNUITIES, and Tables VI. and IX. the value of an annuity on the longest of two lives, aged 40 and 50, at 4 *per cent.* may be found equal to 15.627, which being deducted from 25, and the remainder multiplied into 1000, will produce 9373, and this, divided by 26, will give 360.5*l.* or 360*l.* 10*s.* for the value of 1000*l.* payable on the decease of the survivor of those two lives.

Remark.—It will be observed, that the value of the reversion of an annuity is greater than the value of the reversion of a sum, in the proportion of 1*l.* increased by its interest for a year to 1*l.*; or, which is the same thing, in the proportion of the perpetuity increased by unity to the perpetuity. In the one case, the payment of the annuity becomes due at the end of the year, in which the life or lives become extinct; in the other case, the sum only becoming payable at the end of that year, the annual interest upon it cannot be received till the end of the succeeding year. See Dr. Price's Treatise on Reversionary Payments. Note E, Appendix.

PROB. IV.

To find the value of an annuity for a given term of years after the extinction of any number of lives.

Solution.—Subtract the value of an annuity on the life or lives from the perpetuity; multiply the remainder into the present value of an annuity for the given term, and divide the product by the perpetuity; the quotient multiplied into the annuity will be the value sought.

Example.—Let it be required to determine the value of an annuity of 10*l.* for 20 years, which is not to commence till the extinction of a life of 25, reckoning interest of money at 5 *per cent.* By Tab. VI. (LIFE-ANNUITIES) the value of an annuity on a life of 25, is 13.567; this value, subtracted from 20, and multiplied into 12.4622, the value of an annuity for 20 years, by Tab. III. (ANNUITIES) produces 80.1693; which being divided by 20, and the quotient multiplied into 10, gives 40.085*l.* or 40*l.* 1*s.* 9*d.* nearly for the answer. By proceeding in the same manner, the value of an annuity of 15*l.* for 25 years, after the extinction of two joint lives, aged 30 and 40, and after the longest of those lives, computing at 4 *per cent.* may be respectively found to be equal to 136*l.* and 70*l.* 8*s.* 2*d.* by Tab. VI. and IX. (LIFE-ANNUITIES), and Tab. III. (ANNUITIES).

PROB. V.

To find the value of an annuity after the decease of a given life, or of any number of lives, during the continuance of another life, or of any number of lives, to be nominated at the time of such decease.

Solution.—This differs very little from the preceding problem, and is answered much in the same manner. Subtract the value of an annuity, on the life or lives, from the perpetuity; multiply the remainder into the value of the life or lives at the time of their nomination, and also into the given annuity; divide the product by the perpetuity, and the quotient will be the answer.

Example.—Required the value of an annuity of 100*l.* after the decease of a person aged 30, during the continuance of the life of a person to be nominated at the time of such decease, whose age may be supposed to be then about 15 years, reckoning interest of money at 4*l. per cent.*

By Tab. VI. the value of a life of 30 is 14.781, which being subtracted from 25, and the remainder multiplied into 16.791 (the value by the same table of an annuity on

a life of 15), and also into 100, the given annuity produces 17,158.7. This sum, divided by 25, gives 686.3*l.* or 636*l.* 6*s.* for the value sought.

If, instead of a single life of 30, the annuity had been to commence after the longest of two lives, aged 30 and 35, to continue during the longest of two lives, supposed to be 10 and 15 years of age at the time of the decease of the former lives, the present value in that case, at the same rate of interest, would be, according to the values in Tab. VI. and VIII. (*LIFE-Annuitiæ*), equal to 583.234*l.* or 583*l.* 4*s.* 8*d.* nearly. See Simpson's *Select Exercises*; Dr. Price's *Treatise on Reverſionary Payments*; and Mr. Morgan's *Doctrines of Life Annuitiæ*.

REVERT, in *Law*. A thing is said to revert when it returns or falls back to its first owner.

All honours and royal fees alienated revert to the crown, or are revertible. Apanages, or portions of younger sons of kings, are granted on condition of reversion.

REVERTENS, Lat. returning or descending: as, *Ductus revertens, conducimento, ritornante*, all imply a regular descent of sound; which the Italians likewise call *descendente di grado*.

REVERTER, *Formedon in the*, in *Law*. See FORMEDON.

REVES, JAMES DE, in *Biography*, a learned Dutch Protestant divine and professor, the son of a Dutch burgo-master of Deventer, was born in 1586. While he was very young he was taken to Amsterdam, where he was instructed in the Latin, Greek, and French languages, and then sent to pursue his studies at the university of Leyden. From this place he removed to the university of Franeker, where he learned the Hebrew under the two Drususes. In 1610 he travelled into France for farther improvement, where he resided two years, chiefly at Saumur, Rochelle, and Orleans. He next entered upon the duties of the Christian ministry, and was, in 1641, chosen principal and first professor of the theological college of the states of Holland and West Friesland at Leyden. He died at Leyden in 1658, at the age of 72. His works are very numerous, of which the titles are given in the *General Biography*: among these may be mentioned, "*Belgicarum Ecclesiasticarum Doctrina et Ordo*," &c.; "*Historia Pontificum Romanorum contracta, et ad Annum 1632 contracta*;" "*Daventriæ illustratæ, sive Historiæ Urbis Daventriensis, Lib. vi.*" 1651, 4to. De Reves published an improved edition of "*The Book of Psalms*," in Dutch verse, by Peter Dathenus, and he was concerned in revising the Dutch version of the Old Testament, which was printed at Leyden in 1637.

REVELEMENT, in *Fortification*, is a strong wall built on the outside of the rampart and parapet, to support the earth, and prevent its rolling into the ditch. See CORDON.

REVEZ, in *Geography*, a town of Portugal, in the province of Tras os Montes; 10 miles N.E. of Lamego.—Also, a town of France, in the department of the Sambre and Meuse; 20 miles S. of Brussels.

REUGNY, a town of France, in the department of the Indre and Loire; 9 miles N.E. of Tours.

REVIERS, a town of France, in the department of the Calvados; 8 miles N. of Caen.

REVIEW, in *Chancery*. A bill of review is where the cause has been heard, and a decree therein signed and enrolled; but some error in law appears in the body of the decree, or some new matter is discovered in time, after the decree made. A bill of review is not exhibited but by leave of the court.

A *commission of review* is a commission sometimes granted, in extraordinary cases, to revise the sentence of the court of

delegates; when it is apprehended they have been led into a material error. This commission the king may grant, although the statutes 24 and 25 Hen. VIII. declare the sentence of the delegates definitive; because the pope, as supreme head by the canon law, used to grant such commissions of review; and such authority, as the pope heretofore exerted, is now annexed to the crown by stats. 26 Hen. VIII. cap. 1. and 1 Eliz. cap. 1. But this is not matter of right, which the subject may demand *ex debito justitiæ*, but merely a matter of favour, and which, therefore, is often denied. See APPEAL.

REVIEW, in *Literary History*. See JOURNAL and MAGAZINE.

REVIEW, in *Military Language*, is the appearance of an army, or part of an army, arranged in form of battle, and exercised, in presence of the king or of a general. The firings in reviews are generally thirty-six rounds, viz. by companies; by grand divisions; by sub-divisions; obliquely, advancing, retreating; by files; in the square; street-firings, advancing and retreating; and, lastly, a volley.

The intention of a review is to know the condition of the troops, and to see that they are complete, and that they perform their exercise and evolutions well.

REVIGNY, in *Geography*, a town of France, in the department of the Meuse, and chief place of a canton, in the district of Bar-sur-Ornain; 15 miles S. of St. Menehould. The place contains 1800, and the canton 9087 inhabitants, on a territory of 162½ kilometres, in 17 communes.

REVILING *the Ordinances of the Church*, in *Law*, is an offence punishable by statute. Thus it is provided by 1 Edw. VI. cap. 1 and 1 Eliz. cap. 1. that whoever reviles the sacrament of the Lord's supper shall be punished by fine and imprisonment. See COMMON PRAYER.

REVILLA GIGEDO, in *Geography*, an island in the North Pacific ocean, nearly of an oval form, 50 miles long from N. to S., and 23 in breadth. Capt. Vancouver called it by this name from respect to Conde de Revilla Gigedo, viceroy of New Spain. N. lat. 55° 6' to 55° 55'. E. long. 228° 27' to 229° 15'.

REVILLA GIGEDO, *Canal of*, a strait of the North Pacific ocean, between the forementioned island and that of Gravina.

REVILLY, a town of France, in the department of the Indre; 9 miles N. of Issoudun.

REVIN, a town of France, in the department of the Ardennes, on the Meuse; 6 miles N.E. of Rocroy.

REVIINGHEIM, a town of France, in the department of the North; 5 miles N. of Bailloul.

REVISE, among *Printers*, a second proof of a sheet to be printed, taken off after correcting the first.

REVIVAL *of persons hanged*. See EXECUTION.

REVIVER. See REVIVOR.

REVIVIFICATION, RESUSCITATION, or *Reduction*, in *Chemistry*, the art of restoring a mixed body to its first state, after it had been altered and disguised by dissolution, calcination, and the like. See REDUCTION, and the several metals.

REVIVIFIED ANTIMONY. See ANTIMONY.

REVIVING, in *Law*, a renewing of rents and actions after they had been extinguished.

REVIVOR, or REVIVER, *Bill of*, is where a bill has been exhibited in chancery against one who answers: but, before the cause is heard, or at least before the decree is enrolled, one of the parties dies.

In this case, a bill of revivor must be brought, praying the

the former proceedings may stand revived, and be put in the same condition as at the time of the abatement.

REUNION, *Ile de la*, in *Geography*. See BOURBON.

REVOCATION, REVOCATIO, in *Law*, the act of revoking, calling back, or annulling, a power, grant, &c. made before.

The revocation of an offer, after it is accepted of, is invalid. All preceding wills or testaments are revoked by the last; but the republication of a former will revokes one of a later date, and establishes the first again.

The cancelling or revoking of a testament is one of the three ways of avoiding it. For, though I make a last will and testament irrevocable in the strongest words, yet I am at liberty to revoke it, because my own act or words cannot alter the disposition of law, so as to make that irrevocable which is in its own nature revocable. (8 Rep. 82.) For this, says lord Bacon (Elem. c. 19.) would be for a man to deprive himself of that which of all other things is most incident to human condition; and that is, alteration or repentance. It hath also been held, that without an express revocation, if a man, who hath made his will, afterwards marries and hath a child, this is a presumptive or implied revocation of his former will, which he made in his state of celibacy. (Ld. Raym. 441. 1 P. Wms. 204.) The Romans were also wont to set aside testaments as being "inofficiosa," deficient in natural duty, if they disinherited or totally passed by (without assigning a true and sufficient reason) any of the children of the testator. (Inst. 2. 18. 1.) But if the child had any legacy, however small, it was a proof that the testator had not lost his memory or his reason, which otherwise the law presumed; but was then supposed to have acted thus for some substantial cause; and, in such case, no "querela inofficiosi testamenti" was allowed. Hence probably has arisen that groundless vulgar error of the necessity of leaving the heir a shilling, or some other express legacy, in order to disinherit him effectually: whereas the law of England makes no such constrained supposition of forgetfulness or infamy; and, therefore, though the heir or next of kin be totally omitted, it admits no "querela inofficiosi" to set aside such a testament.

The revocation of a devise of lands and tenements must be in writing, signed by the testator, or some other person in his presence, and by his express direction; and be subscribed, in his presence, by three or four credible witnesses.

A prior claustral is revocable at pleasure. The revocation of the edict of Nantes was fatal to the French Protestants.

REVOCATION of *Uses*. See USE.

REVOLAX, in *Geography*, a town of Sweden, in the government of Ulea; 13 miles E. of Brahestad.

REVOLSKOI, a town of Russia, in the government of Viborg; 128 miles N.W. of Povenetz.

REVOLUTION, formed from *revolvere*, to roll backwards, in *Politics*, denotes a grand turn or change of government.

There are no states in the world but have undergone frequent revolutions. The abbot de Vertot has furnished us with two or three good histories of the revolutions of Sweden, the revolutions of Rome, &c.

The REVOLUTION, used with us by way of eminence, denotes the great turn of affairs in England in 1688, when king James II. abdicating, the prince and princess of Orange were declared king and queen of England, &c. See *Right of CROWN*.

The declaration of the prince of Orange, which was dispersed over the kingdom previously to his arrival, and which was received with universal approbation, contained an enu-

meration of the grievances of the nation, and the statement of which evinced the absolute necessity of a change in the government. These grievances were the dispensing and suspending power exercised by the king; the court of ecclesiastical commission; the filling of all offices with Catholics, and the raising of a Jesuit to be privy-counsellor; the open encouragement given to popery, by building every where churches, colleges, and seminaries for that sect; the displacing of judges, if they refused to give sentence according to orders received from court; the cancelling of the charters of all the corporations, and the subjecting of elections to arbitrary will and pleasure; the treating of petitions, even the most modest, and from persons of the highest rank, as criminal and seditious; the committing of the whole authority of Ireland, civil and military, into the hands of papists; the assuming of an absolute power over the religion and laws of Scotland, and openly exacting in that kingdom an obedience without reserve; and the violent presumptions against the legitimacy of the prince of Wales. The redress of these grievances was the prince's professed object; and for this purpose he proposed to have a loyal and free parliament assembled, in order to provide for the safety and liberty of the nation, as well as to examine the proofs of the prince of Wales's legitimacy. The prince, at the same time avowed, that he had no other design than to procure the full and lasting settlement of religion, liberty, and property. On the moment of alarm the English ministers redressed some of the grievances of which complaint had been made; but there still remained the foundation of all grievances upon which they could again in an instant be erected, an arbitrary and despotic power in the crown. For this usurpation there was no possible remedy, but by a full declaration of all the rights of the subject, in a free parliament. On the 21st of October 1688, the prince set sail from Helvoetsluys, with a fleet of near 500 vessels, and an army of above 14,000 men. A storm drove him back, but he soon repaired his loss, and made sail with a fair wind towards the west of England. The same wind detained the king's fleet in its station near Harwich, and enabled the Dutch to pass the straits of Dover without opposition. Both shores were covered with multitudes of people, who, besides admiring the grandeur of the spectacle, were held in anxious suspense by the prospect of an enterprise, the most important, which, during some ages, had been undertaken in Europe. The prince had a prosperous voyage, and landed his army safely in Torbay, on the 5th of November, (1688,) the anniversary of the gunpowder treason. The first person who joined the prince was major Buerington; and he was quickly followed by the gentry of the counties of Devon and Somerset. Sir Edward Seymour made proposals for an association, which every one signed. By degrees, the earl of Abingdon, Mr. Russell, son of the earl of Bedford, Mr. Wharton, Godfrey, Howe, came to Exeter. All England was in commotion. Lord Delamere took arms in Cheshire, the earl of Danby seized York, the earl of Bath, governor of Plymouth, declared for the prince, and the earl of Devonshire made a like declaration in Derby. The nobility and gentry of Nottinghamshire embraced the same cause; and every day there appeared some effect of that universal combination into which the nation had entered against the measures of the king. Even those who took not the field against him, were able to embarrass and confound his counsels. A petition for a new parliament was signed by 24 bishops and peers of the greatest distinction, and was presented to the king. No one thought of opposing or resisting the invader. The army deserted him; and several officers of distinction informed Feversham, the general, that they could not in conscience

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fight against the prince of Orange. Prince George of Denmark and the princess Anne abandoned the king: an event which, concurring with several other incidents that had occurred, and which threatened the overthrow of his royal authority, occasioned an alarm approaching to consternation, and a grief that caused him to shed tears. In this state of distress, deserted by his friends and family, and despised by his enemies, he was as much depressed, as he had before been vainly elated by prosperity. He issued writs for a new parliament, and deputed commissioners to treat with the prince of Orange. The king every day more and more alarmed by accounts of the general disaffection that prevailed, and misled by imprudent counsel operating upon his fears, precipitately embraced the resolution of escaping into France, having sent before him the queen and the infant prince. Nor before his departure did he provide for the exercise of the administration; he threw the great seal into the river, and recalled all the writs that had been issued for the election of the new parliament. During this temporary dissolution of government, the populace became masters, rose in a tumult, destroyed the mass-houses, and even attacked and rifled the houses of the Florentine envoy and Spanish ambassador, where many Catholics had lodged their valuable effects. Having discovered Jefferies, the chancellor, notwithstanding the disguise he had assumed in order to fly the kingdom, they so abused him that he died soon after. Feversham disbanded the troops, and without either disarming or paying them, let them loose to prey upon the country. In this extremity, the bishops and peers, who were in town, assembled, and having chosen the marquis of Halifax speaker, gave directions to the mayor and aldermen for keeping the peace of the city, and issued orders, which were readily obeyed, to the fleet, the army, and all the garrisons; and they made applications to the prince of Orange, whose enterprize they highly applauded, and whose success they joyfully congratulated. The prince, availing himself of the popularity of his cause, approached nearer and nearer to London. In the mean while the king, though disguised, was discovered and seized by the populace at Feversham, where he was attempting to make his escape, and soon after arrived in London. Whilst he remained at Whitehall he received few marks of attention and respect; and whilst he remained there the Dutch guards took possession of the palace. In consequence of a message conveyed to him from the prince by Halifax, Shrewsbury, and Delamere, which commanded him to leave the palace, he removed to Ham, a seat of the duchess of Lauderdale's. Having obtained permission he retired to Rochester, where he remained for some days. But finding that the church, the nobility, the city, the country, all concurred in neglecting him, and leaving him to his own counsels, he submitted to his melancholy fate; and being urged by earnest letters from the queen, he privately embarked on board a frigate which waited for him; and he arrived safely at Ambleteuse in Picardy, whence he hastened to St. Germain's. The prince, in compliance with an address from about 90 peers and bishops, summoned a convention, which completed the revolution.

The true ground and principle upon which that memorable event proceeded, was an entirely new case in politics, which had never before happened in our history; the abdication of the reigning monarch, and the vacancy of the throne thereupon. Accordingly, in a full assembly of the lords and commons, met in *Convention* (which see) on occasion of this vacancy, both houses came to this resolution (Jan. 22, 1689): "That king James the Second, having endeavoured to subvert the constitution of the kingdom, by breaking the original contract between king and people; and, by the advice

of Jesuits, and other wicked persons, having violated the fundamental laws; and having withdrawn himself out of this kingdom, has abdicated the government, and that the throne is thereby vacant."

The facts themselves thus appealed to, *viz.* the king's endeavour to subvert the constitution, by breaking the original contract, his violation of the fundamental laws, and his withdrawing himself out of the kingdom, were evident and notorious: and the consequences drawn from these facts (namely, that they amounted to an abdication of the government (see *ABDICATION*); which abdication did not affect only the person of the king himself, but also all his heirs, and rendered the throne absolutely and completely vacant) it belonged to our ancestors to determine. For, whenever a question arises between the society at large and any magistrate vested with powers originally delegated by that society, it must be decided by the voice of the society itself: there not being upon earth any other tribunal to which to resort. And that these consequences were fairly deduced from these facts, our ancestors have solemnly determined, in a full parliamentary convention representing the whole society. The reasons upon which they decided may be found at large in the parliamentary proceedings of the times, our ancestors having most indisputably a competent jurisdiction to decide this great and important question, and having in fact decided it, it is now become our duty at this distance of time to acquiesce in their determination; being born under that establishment which was built upon this foundation, and obliged, by every tie, religious as well as civil, to maintain it.

The lords and commons having determined this fundamental article, that there was a vacancy of the throne, proceeded to fill up that vacancy in such manner as they judged the most proper. And this was done by their declaration of the 12th of February, 1689, in the following manner: "That William and Mary, prince and princess of Orange, be, and be declared king and queen, to hold the crown and royal dignity during their lives, and the life of the survivor of them; and that the sole and full exercise of the regal power be only in, and executed by, the said prince of Orange, in the names of the said prince and princess, during their joint lives; and after their deceases the said crown and royal dignity to be to the heirs of the body of the said princess; and for default of such issue, to the princess Anne of Denmark, and the heirs of her body; and for default of such issue, to the heir of the body of the said prince of Orange." This transaction, founded in equity, and strictly agreeable to the spirit of our constitution, and the rights of human nature, formed a new era in the history of our country, in which the bounds of prerogative and liberty have been better defined, the principles of government more thoroughly examined and understood, and the rights of the subject more explicitly guarded by legal provisions, than in any other period of the English history.

To the settlement of the crown was annexed a declaration of rights, in which all the points that had, of late years, been disputed between the king and people were finally determined; and the powers of royal prerogative were more narrowly circumscribed and more exactly defined than in any former period of the English government. It is worthy of observation, says judge Blackstone, that the convention avoided with great wisdom the wild extremes into which the visionary theories of some zealous republicans would have led them. They held that this misconduct of king James amounted to an *endeavour* to subvert the constitution; and not to an actual subversion, or total dissolution of the government, according to the principles of Mr.

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Locke (Gov. p. 2. c. 19.); which would have reduced the society almost to a state of nature; would have levelled all distinctions of honour, rank, offices, and property; would have annihilated the sovereign power, and in consequence have repealed all positive laws; and would have left the people at liberty to have erected a new system of state upon a new foundation of polity. They therefore very prudently voted it to amount to no more than an abdication of the government, and a consequent vacancy of the throne; by which the government was allowed to subsist, though the executive magistrate was gone, and the kingly office to remain, though king James was no longer king. Thus the constitution was kept entire; which, upon every sound principle of government, must otherwise have fallen to pieces, if so principal and constituent a part as the royal authority had been abolished, or even suspended. Blackst. Comm. book i, &c. book iv. Hume's Hist., vol. viii.

REVOLUTION, *French*, in its most popular sense, was for several years, after 1789, understood in England to consist of those events which at the outset destroyed the usual order of things, viz. the Parisians' revolt, the capture and destruction of the Bastille, and the submission of the monarch. But these events, singular and important as they were, could not constitute a political revolution: this must have required a change in the government. It is capable, says Mr. (now Sir James) Mackintosh, of three senses. The king's recognition of the rights of the states-general to a share in the legislation, was a change in the actual government of France, where the whole legislative and executive power had, without the shadow of interruption, for nearly two centuries, been enjoyed by the crown; in that sense, the meeting of the states-general was the revolution, and the 5th of May 1789 was its epoch. The union of the three orders in one assembly was a most important change in the forms and spirit of the legislature. This, too, may be called the revolution; and the 23d of June of the same year will be its epoch. This body, thus united, formed the new constitution, which may be called a revolution; because, of all the early political changes, it was the most important, and its epoch was determined by the conclusion of the labours of the National Assembly, on the 30th of September 1791, when the king, Louis XVI., came to the assembly, and having addressed the members, the president proclaimed in his own name, and in the name of the whole body, that "the constituent assembly declares that its power is at an end, and that it will sit no longer." In whatever sense the phrase be taken, the effects have been so momentous, as to claim the attention, and excite the awe of the whole civilized world. In a work of this kind it is impossible to enter into the detail of the various events connected with the French revolution: these must require the pen of the historian, who can devote years to the investigation of facts, and to the development of the motives by which the great actors have been impelled to engage in the several parts connected with their names. The history of the French revolution will afford ample scope and abundant materials for the most interesting narrative of modern times. The New Cyclopædia, embracing every topic connected with human knowledge, cannot devote much space to the history of any country, and still less to a single event connected with an individual state. In the articles FRANCE and LEWIS XVI. we have given a pretty full account of the causes which led to the French revolution, and of the changes which took place previously to the destruction of the Bastille: of the confederacy of the crowned heads against the popular governments, which were established, one after another, on the ruins of the old constitution: of the proscriptions and massacres which were perpetrated in Paris;

and finally, of the decapitation of the king, queen, and the king's sister. We have then traced the progress of Bonaparte, from his consulship to the high dignity of emperor, and noticed the vast and unprecedented power to which he attained over almost the whole continent of Europe, mentioning the kings that had been created by his fiat, and the states that had been subject to his controul, or that stood in awe of his power. This mighty conqueror we followed, in the article France, to his divorcement of Josephine, and marriage with the daughter of the emperor of Germany.

In addition to the above-named articles, to which the reader is referred, we have now to trace the steps of this man from the year 1810, to his expulsion from the throne and empire of France, and shew by what means his obstinacy and ambition caused him to fall from the highest dignities, to which perhaps mortal man ever arrived, to a state of mortification and almost insignificance as the exile to Elba, which may be regarded as the end of the revolution.

For some time the very nature of commerce must have operated as much to the prejudice of his own merchants, as they could do to the prejudice of the merchants of this country; he struck more directly and fatally at the liberty of his subjects by his decrees respecting prisons, domestic servants, and the press.

In the decree respecting prisons, to which we referred in the article FRANCE, it was explicitly declared, that there were many persons, in that country, accused of crimes against the state, whom it was neither safe to liberate nor to bring to trial: for the purpose of keeping these prisoners in safe custody, a number of strong prisons were reared in the heart of the country, in which it was determined they should be confined. There might have been some plea for this mode of conduct during the convulsions of the revolution:—then it might not have been safe nor prudent either to have brought to trial, or to have liberated men whose popular character, or cause, probably would, in the one case, have excited fresh disturbances; and in the other have assured their acquittal, however strong and full the proofs of their guilt might have been. But under the existing order of things it was impossible for the emperor of France to pronounce a stronger libel on his own government, than could be inferred from such a decree. At this time, indeed, he reigned with the most despotic sway over the French, and he seemed resolved to establish, in the heart of Europe, and over a people enlightened by science, a despotism unknown even to the ignorant and enslaved nations of the East. By his decree respecting servants it was evident, that its object was not to be confined to persons in that condition of life, but that it was meant, by putting them under such strict and harsh regulations, to have always at command spies in every family, and thus to establish a more regular and perfect system of espionage. To these acts he issued his mandate, which went to destroy every advantage which attaches to a free press; this, indeed, was not calculated to excite astonishment, for in all despotic countries the liberty of the press has been the object of the tyrant's fear and hatred. At no period did France ever enjoy a free press; but Bonaparte, who seems to have examined and compared all the tyrannical proceedings and measures of despotic governments, both ancient and modern, with a view to improve upon them, and from them to establish a perfect system in France, which should crush the powers of the human mind, had gone beyond all former precedent. By his decrees in the year 1810, of which we are speaking, only a certain number of printers were allowed to carry on their business within the French territories, and these were to be under the most strict and watchful

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ful superintendance of the police; so that nothing could be printed, but what government thought proper to allow and sanction. This has always been the object in despotic countries; but it was obtained with great difficulty, and never with such perfect success as was desired. By diminishing the number of printers, Bonaparte removed the chief difficulty towards destroying the liberty of the press, and succeeded in placing France in a state of mental bondage, perhaps without a parallel in the history of the world.

During this period the emperor of France was employing his troops in Spain, with a view of subjugating that country and Portugal, and uniting the whole peninsula to his already too vast empire. By the exertions chiefly of Great Britain his plans were frustrated. Bonaparte seems, indeed, to have been completely thrown out of his expectations and calculations with respect to the resistance, which he met with in his designs on the independence of Spain; and the protracted and obstinate nature of the contest proved that for a considerable length of time he carried on the war there in a desultory manner, by armies apparently unconnected with each other, and by means not acting in concert and co-operation. About the beginning of 1811, however, a regular plan appears to have been formed by Bonaparte for conducting the war in Spain. The principal feature in this plan was the occupancy of the chief cities in the peninsula: and at the end of the year the French had made considerable progress, they had taken possession of most of the chief towns in Spain; their progress had been slow, attended with great difficulty, interrupted with many reverses, and purchased at heavy expenses; still they had made progress, and the emperor, if he could accomplish his objects, never regarded the cost.

In the domestic history of France, the only thing that occurred worthy of notice was the birth of a son to the emperor, who was immediately designated as king of Rome, and in that character received the servile homage of the legislators of the empire. It was the subject of frequent remark, that after the second marriage of Bonaparte, he for many months seemed to abandon his restless and ambitious projects (with the exception of his attempts on Spain), or that he took much longer time for their execution. During the year 1811, rumours of war between France and Russia frequently arose, and as frequently subsided without any act of hostility on either side. It was not till the spring of 1812 that the war commenced, which was ultimately the cause of the overthrow of the French emperor.

On the 9th of May, 1812, Bonaparte set out from St. Cloud, on the 6th of June he crossed the Vistula, and on the 22d of that month he formally declared war against Russia; two days after this he crossed the Niemen, entered the Russian territories, and immediately commenced hostilities by the capture of Kowno, and on the 28th he entered Wilna, the capital of Russian Poland. In this war he expected considerable assistance from the Poles; he knew their rooted enmity to Russia, and though he had already deceived them, in the expectations which he had led them to form of his erecting Poland again into a kingdom, yet he well knew how to inspire them again with confidence in him: as soon, therefore, as he had entered Poland, his first public act was to proclaim it anew. A diet was immediately assembled, a constitution framed, and the name and form of liberty were restored to the Poles.

Bonaparte had not been long in Russia before he began to experience the disasters of the climate. In the month of July, and when his army was not much farther north

than Wilna, a tremendous tempest arose; torrents of rain fell; thousands of his horses perished, and many pieces of artillery were buried in the mud. His disappointment and chagrin began to manifest themselves; he broke out into invectives on the barbarity of the Russians for laying waste their country in their retreat. Although many severe battles were fought, still the Russians refused to hazard a general engagement. Their perseverance in the plan of retreating astonished the world, and mortified, beyond conception, their enemies, who had no means of preventing this kind of warfare. It was imagined, that for a short time only they would follow up this system, and that their steadiness, passive courage, and patriotism would give way, when they perceived the enemy advancing, notwithstanding their obstinate perseverance, the advanced state of the season, and the desolation of the country. But Russia was animated with one soul, the dread and detestation of the French rose superior to every feeling: considerations of personal interest or comfort, even the sight of their families driven from their homes, and those homes abandoned to the enemy or the flames, had no room in the breast of the Russians: there dwelt only the determination to expel the French, and to obey every command of their sovereign, issued by him or his generals for that purpose. The proclamations of Alexander encouraged the enthusiasm and animated the patient and heroic sufferings of the people; they said, that the emperor was determined to make no peace with Bonaparte, while his legions polluted the soil of Russia: that he would sacrifice all, even Peterburg and Moscow, rather than they should fall into the hands of the enemy. In all the proclamations of Alexander there was no irresolution, no despondence, no expression, that could lead Bonaparte to indulge the hope, that he would propose, or even listen to terms of peace; or his subjects to apprehend, that he would not persevere in what he had begun. New levies were ordered to be raised; the Russian people were invoked by all those powerful feelings and prejudices, which ignorance and superstition create; and when a Russian is told, that what he has to do, or to suffer, is for the sake of his sovereign or his religion, he is made insensible to danger and misery.

Kutusoff continued his retreat, at the head of the main Russian army, till he arrived at Borodino, within a short distance of Moscow. The position here was extremely favourable for defence; though it did not cover the capital, as there were other roads leading to it. On the 7th of September the famous battle of Borodino was fought; it continued from six in the morning till night, when the French, though masters of one part of the field, retreated. The loss on this occasion was immense; not less than 60,000 men are supposed to have fallen on both sides. Both sides claimed the victory; and at Petersburg it was imagined, that Moscow was rendered perfectly secure by the defeat of the enemy. The French, however, retreated, only for the purpose of meeting a strong reinforcement which was advancing, and which actually arrived within a day or two of this tremendous engagement. At the head of these he put himself, and prepared to march by another road for Moscow. As soon as the Russian general was informed that Bonaparte had been reinforced, and that he was manœuvring to get to Moscow by turning the Russians, he resolved to abandon that capital to its fate. Bonaparte therefore advanced to Moscow unmolested, but on his entrance into the city, on the 11th of September, he found its governor and inhabitants animated with the true Russian spirit. They made every resistance in their power to the entrance of the enemy; a great part of the effective population was armed, and as soon as the

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advanced guard of the enemy appeared they attacked them in the streets, and from the houses, impeding their progress, and causing great destruction; and, when it was no longer practicable to prevent the entrance of the enemy, the city was set on fire, and, as it was built principally of wood, the fire spread rapidly in all directions; and before the French could stop the progress of the flames, only a tenth part of it remained unconsumed. It is impossible to describe or even imagine the disappointment, mortification, and wrath of Bonaparte when he beheld Moscow in flames. He had promised his soldiers rest from their fatigues, refreshments, provisions in abundance, and comfortable winter-quarters in it. These were now all at an end: amidst the ruins of Moscow his army would in vain seek for shelter from the inclemencies of the approaching winter, or for a supply of provisions. His indignation soon broke out in conduct at once tyrannical, cruel, and mean: he seized on the men who had set fire to the city, and caused them to be executed.

The situation of the French army in Moscow was now most critical: they were surrounded with armies almost as numerous as themselves, and which were daily increasing. Winter was already making its appearance: the troops had been completely worn down by their long march, and at the end of it, they had met with a reception which neither their leader nor they could have anticipated. The former was certain in his own mind that a complete victory must be the result of the battle of Borodino, and that, as a price of peace, Alexander would find a supply for all their wants, at the expense of his own subjects. Instead of this, the victory was not at all decisive, and Bonaparte advanced with the most cautious steps into Moscow, well knowing, by a fatal experience, that he beheld an enemy in every Russian he met. He soon saw that he could not remain in the ruins of the city till spring should open to him a communication with the southern provinces; and if they retreated, how were they to obtain provisions, and endure a march of 500 miles in a severe and desolating winter, through deep snows, and by the hidden and almost impassable roads of Russia? The Russian generals, true to the cause of their country, and inspired by the animating proclamations of their emperor, took the most active measures to force Bonaparte from Moscow, by cutting off his supplies; and when they had compelled him to retreat, to harass him in every inch of his journey. For this purpose a great number of Cossacks, besides those who had been already employed, were collected, and this was the season of their utility and triumph.

Bonaparte was now sensible of the dreadful error he had committed: unless he actually expected to dictate terms of peace at Moscow, it was the extreme of madness to have proceeded thither at the beginning of a Russian winter; and if he did expect either to dictate terms of peace, or to have his own offers accepted, he must have been ignorant of the determined hatred which all ranks in Russia bore towards him. The apology he offers in his bulletins, for his military career in Russia, is a paltry one; according to him, the Russian winter this year commenced earlier than usual; as if the circumstance of the frost setting in a very few days sooner or later could have saved or destroyed his army! What must be the military prudence of that man, who calculates for the safety of his army, and the success of his measures, on so uncertain a thing as climate! The fact is, Bonaparte, in all his former campaigns, had been indebted for his success to the boldness of his advances into the very heart of the enemy's country; that this boldness did not assume the character, deserve the name, and produce the consequences of rashness, was less owing to his own foresight and circumspection than

to the pusillanimity, treachery, and want of talents of his opponents: without adverting to the different circumstances in which he was placed in Russia, from a difference of climate and national character, he followed his usual plan, thus proving that he was defective in one great feature of a man of abilities, the adaptation of general principles and plans to particular circumstances.

Perceiving that, though he was in the heart of the Russian empire, and amidst the ruins of its ancient capital, no terms of peace were proposed, and that the Russians were gathering round him on all sides, he sent to Kutusoff to propose terms of accommodation, or, at least, an armistice. The Russian commander received the French negotiator in the midst of his generals, and replied to him with the utmost frankness: he told him, that he was not authorized to receive any proposals either for peace, or an armistice; that he would not even send to Alexander nor receive the letter which Bonaparte had sent; and that, with respect to an armistice, the Russian army had no occasion for it, and they were in possession of too many advantages to throw them away by accepting it. The negotiator then began to complain of the savage manner in which the war had been conducted; to this Kutusoff replied in language which ought always to be had in remembrance by invaders: "The French (he said) had introduced the barbarities of which they complained; they had commenced hostilities without reason; had invaded Russia; had inflicted as much misery on its inhabitants as they could; and now, when vengeance and retaliation were at hand, they wished for peace; peace must not even be mentioned till the invaders had retraced their steps, and had again crossed the Vistula; Bonaparte had nothing to do but get out of Moscow how he could, since he came thither without being invited; the Russians, he might depend upon it, would do their duty,—and the duty which they owed their sovereign, their country, their murdered or desolate wives and helpless children, demanded that they should make their invaders suffer as much misery as possible: Bonaparte had proclaimed the campaign at an end at Moscow, but with the Russians it was only beginning." At another time, when the French complained of the excesses of the Cossacks, who had even fired upon their flags of truce, they were told by the Russian general that the Cossacks acted according to orders: "we want," said he, "not to hear of parleys; our object is to fight, not to negotiate; take your measures accordingly." Perceiving that there was no chance of peace, or an armistice, and that the Russians were fully sensible of their own power, and of the reduced and miserable state of the French army, and had formed their plans in such a manner, as to take the utmost advantage of their own good fortune, Bonaparte, after having been upwards of a month in Moscow, prepared for his retreat. A retreat of greater difficulty, and accompanied with more misery, has never been recorded in the annals of history. On the first days of it, the sufferings of the soldiers were feelingly and accurately described in an intercepted letter from the viceroy of Italy. "Three days of suffering have so broken down the spirits of the soldiers, that I look upon them, at the present moment, as scarcely capable of making any effort whatever. Many of them have died of hunger or of cold; many others have gone and surrendered themselves to the enemy." The sufferings of the French, however, were greatly to be increased by hunger, and the severity of the climate.

Early in November the Russian winter set in with more than its accustomed rigour: hitherto the roads had been only deep and heavy, now they became so excessively slippery, that the men could scarcely keep their feet: hitherto the horses, necessary both for the artillery and for the sustenance of

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of the soldiers, for they were compelled and glad to feed on horse flesh, had proceeded feebly and slowly on, or dropped dead only, a few hundreds every day; but the first day of the frost, nearly 30,000 perished. All possibility of carrying forward their artillery was now at an end; the spirits of the soldiers completely deserted them: they crawled on, exposed to the most dreadful cold, exhausted with fatigue and hunger, emaciated, and almost naked. The road was literally blocked up with the dead and the dying: they had no power to defend themselves against the Cossacks, who constantly hovered round them: they had no inclination to do it: death to them would have been a blessing: at the sight of the Cossacks they hoped their miseries would soon be terminated: but their enemies were not so merciful as to put them to death; piercing them with wounds, stripping off the little covering they had, they left them on the snow, there bleeding and naked, exposed to the rigours of a Russian winter. Whenever the French entered any village where there was the least chance of repose or food, they exerted their little remaining strength, and crawled on their hands and feet to seek it. Frequently, just as they had stretched out their hands to seize a little food, or reached the threshold of a wretched hut, under which they looked for shelter from the weather, perhaps for a few minutes sleep, the remnant of their strength failed them, and they expired.

With what feelings and sentiments did they now regard Bonaparte! No longer the adored general, who seemed to have chained victory to his car, to be more than mortal, and to be declined to render all Europe subservient to the interests and glory of France; they cursed him as the author of all the misery under which they were writhing; on his person they willingly would have inflicted vengeance; but sensible of their indignation, he had gathered round his person his principal officers, mounted on almost the only horses that remained. For some time he rode in a coach, till the dreadful voice of his soldiers commanded him to walk as they did, and to share their fatigue; he still, however, defended himself from the inclemency of the weather with a cloak; "off with your cloak" was another stern command, that he durst not disobey. Such was the situation,—such the feelings of the French army during their dreadful retreat, in which every thing that could accumulate or sharpen misery beset them. It scarcely needed the presence of an enemy to complete the work of destruction; the climate of Russia, aided by hunger, was amply sufficient.

In fact, the French soldiers could no longer be said to compose an army; they were straggling in all directions, anxious indeed to avoid the Cossacks, since from them they experienced only an aggravation of their misery, but not unwilling to fall in with the regular Russian troops, in the hope of being taken prisoners, or falling in battle. Their ignorance of the country, and the state of the roads, were such, that the different divisions of the French army could not support one another; and frequently when expecting to fall in with the main body, they encountered the enemy and were taken prisoners. On the 10th of November, before they reached Smolensk, general Augereau, with 2000 men and 60 officers, surrendered themselves; this was the first instance, during the present war, of a whole corps laying down their arms. It is computed that in three days time, prior to that date, they lost 20,000 men, besides nearly 20,000 more that fell in the previous engagements; nearly 300 pieces of cannon had also either fallen into the hands of the Russians, or had been spiked and buried by the French. But these losses, enormous as they were, were only preludes to greater ones.

It is extremely difficult to form an estimate of the loss of the French in this dreadful campaign. The Russian official accounts state that they took upwards of 150,000 men; and it was calculated that the number of killed, and of those who perished by hunger, fatigue, and cold, amounted nearly to 100,000; so that reckoning that the French army when it crossed the Niemen, and began the campaign, amounted to 300,000 men, scarcely more than 50,000 escaped out of Russia; and of those, a large proportion must have suffered so dreadfully as to be absolutely unfit for future service. Such is a bare outline of this disastrous campaign, the consequences of which have proved so important to the liberties of Europe. In it we have seen the first general of his age, at the head of one of the finest armies that was ever raised, and which placed in him the most unbounded confidence, flying, beaten, disgraced, bereft of the greatest part of his troops, and the object of detestation to the remainder. This is an event which, taken under all its circumstances, cannot be paralleled in history. No war, ancient or modern, exhibits such destruction and misery; more, no doubt, have fallen in the field, in the course of a campaign; but no army ever perished with such lingering and varied misery. The cause of the failure of the Russian campaign under the auspices of that same general, who had on almost all great occasions been successful before, is the business of the historian to investigate, and will long afford matter for speculation and curious discussion. "It has scarcely ever fallen to the lot of the historian or annalist," says the intelligent writer in the *New Annual Register*, "to narrate such disasters; and when we consider that these disasters beset a man who, from a low station in society, had raised himself to the very summit of power, to an extent of dominion and influence never before witnessed in Europe; that this man, for the purpose of a mad, bloody, and desperate ambition, had trampled on all the laws and usages of justice and civilized society; and that he considered himself, and called upon the world to acknowledge and fear him, as absolutely beyond the reach of fate, as something more than mortal; when we moreover reflect on the peculiar interest which this country felt in all that beset him, since against this country was his most implacable and deadly hatred directed; and from that hatred, his ruin indirectly originated; when we take all these things into our account, we must acknowledge that we cannot examine too closely, or scrutinize too minutely, the causes of his failure in the Russian campaign."

It appears, then, that these causes may be classed under two general heads, *viz.* those which proceeded from the nature of the country which he invaded, and the characteristic qualities of its inhabitants; and those which originated from the peculiar character of the invader.

In the first place, the constitution of the Russian army, and the character of the Russian soldiers, contributed in no small degree to the fate of Bonaparte. The Russians, from their infancy, are most devotedly attached to their emperor, and to their nobility. Philosophers may ridicule the idea, or disbelieve the assertion, that the common people of Russia are attached to those who act towards them, in too many instances, as tyrants. But history is conversant with facts, not with theories and speculations; and the fact is, that the Russian common people, even before they enter the army, are most devoutly attached to their emperor and nobility. This attachment becomes still more strong and influencing when they enter the army:—they then regard themselves, in a more special manner, as entirely at the service of their sovereign; and look upon it as the highest honour which can befall them, to suffer any privation or misery, or even death itself, at his command, and for his sake.

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fake. Military discipline, with the troops of most other nations, is a habit acquired late in life, irksome and abhorrent to former habits, and broken through whenever it can be done with safety. But it is far otherwise with the Russian soldier: he knows no habits; he has no feeling or sentiments incompatible with the strictest military discipline: on the contrary, all his other habits, feelings, and sentiments, work to the accomplishment of the same end: all serve and contribute to render him an excellent soldier, so far as strictness of discipline is concerned. Knowing no disgrace so great as disobedience to the orders of his officers, and especially to the commands or even wishes of his sovereign, he never stirs from his post till he is expressly directed so to do: the idea of flight never enters his mind. But his steadiness is not merely passive; endowed with great bodily strength, and with a robustness of constitution superior to every fatigue or privation, he wears out his more skilful and experienced opponent, by whom he may be outmanœuvred or slain, but cannot be forced to fly.

Hence Bonaparte never met with more obstinate resistance than he did from the Russians at the battle of Eylau: his troops were weary with slaughter, but still they could not defeat the Russians; and had the French emperor been a man who could be taught mortifying or disagreeable truths by experience, after his first campaign against the Russians, on the borders of their own country, he never would have attempted to conquer them, in the very heart of their empire, and in the midst of a Russian winter.

In the second place, the character of the Russian generals contributed not a little to the defeat of Bonaparte: his avowed object in the invasion of Russia, was to compel the emperor Alexander to adhere to the continental system, that was, to forbid all trade between Russia and England; but this would have been the ruin of the Russian nobility, whose incomes were almost exclusively derived from this commerce. Bonaparte, therefore, was making war upon them, and they must have regarded his invasion as peculiarly directed against them. This feeling would contribute to render them faithful and steady to the cause of their country, and at the same time stimulate them to put forth all their activity and talents in the contest. Besides, the Russian nobility partake with the common people in that physical attachment to the soil and institutions of their country, which excites their hatred most strongly against all invaders. Hence they were above the influence of Bonaparte's promises and bribes.

In the third place, the plan of the campaign which the Russian government had laid down, contributed very essentially to the overthrow of Bonaparte's hopes and projects. This plan was, on every occasion, where they could oppose Bonaparte, there to oppose him, but never in such a manner as might bring on a general action, or an action that could be decisive against themselves. Thus, the farther he advanced the weaker he became; and after every engagement, though he apparently succeeded in driving back the enemy, the real state of his affairs was rendered worse: he was led further from his resources, deeper into the heart of a country utterly incapable of supporting a large army, and more completely surrounded by the Russians.

In the fourth place, the character of the Russian peasantry contributed much to the defeat of Bonaparte: these could not be seduced from their allegiance; they uniformly, and to a man, refused to hold any communication with the enemy: while Moscow was in the hands of the French, they brought no goods in for sale: they regarded it as a polluted city, and would have shuddered to have entered it.

To these causes must be added the firmness of Alexander; and the nature and climate of the country.

The next class of causes which contributed to Bonaparte's discomfiture and ultimate ruin, must be sought for in his own peculiar character, in which the most predominant and influential is his obstinacy. Accustomed to see all his plans succeed, all his predictions, however extravagant, verified, he could ill-brook disappointment: he could not even suffer himself to admit that he had acted an imprudent and rash part, and preferred perseverance in error, to the acknowledgment and rectification of it. His obstinacy operated in giving rise to the invasion of Russia, as well as influencing his conduct during that invasion. He probably pushed forward into Russia notwithstanding the losses which he sustained, and afterwards continued in Moscow till winter had rendered his retreat almost impossible, under expectation, or at least the hope, that Alexander would be induced to propose terms of conciliation. This certainly influenced his conduct; "but," says a good writer, "whoever has studied the character of obstinate people, must be convinced that at last, when their obstinacy is got to its greatest height, they persevere in the course which must infallibly conduct to ruin, without even the most groundless hope of extricating themselves. The impulse in this state of mental disorder, for so it may be denominated, is blind, and almost mechanical. So it probably was with Bonaparte, when he determined to remain so long at Moscow."

How different were the affairs of this man at the commencement of 1812, from what they were at the same period in the following year. At the former every thing was prosperous, except perhaps the war in the peninsula; and that, it was generally believed, he could, at any time, turn in his favour by sending a larger army there. Russia, though uneasy under the operation of the hard terms to which she submitted at the peace of Tilsit, would scarcely have ventured to commence a new war; while the subserviency of Prussia to his will, his absolute command of her fortresses which are on the confines of Russia, and his alliance and family connexion with Austria, seemed to promise him the easy conquest of Russia whenever he should think proper to attack her. At the latter period he no longer appeared as the invincible conqueror, but as the fallen general, who had fled to his capital with unexampled celerity, to avoid the indignation of the fragments of that army which had been sacrificed to the madness of his ambition. He who had always detailed victories the most splendid, who had, in direct language, held himself out as superior to all the casualties of war, was now obliged, in his own bulletins, to confess that his army was broken, and it was returning towards France defeated and harassed by the Tartars of Asia.

Thus changed in power, in feelings, and in prospects, the Parisians saw their emperor at the beginning of the year 1813, and they, as well as Europe in general, were extremely anxious for the meeting of the legislative body, in order that they might be able to develop his future plans. At this meeting, on the 14th of February, he declared it to be his determination still to carry on the war, and to sacrifice nothing for the sake of obtaining peace: "The French dynasty," says he, "reigns, and will reign, in Spain. I am satisfied with all my allies; I will abandon none of them; I will maintain the integrity of their states; the Russians shall return to their frightful climate. I desire peace, but I will never make any but an honourable peace, and one conformable to the interests and grandeur of my empire." The whole tone of his address was warlike, and he immediately set on foot a new conscription, which, by means of his gens

d'armes,

d'armes, he readily carried into effect, at least to a certain point. By means of uncommon exertion and activity, joined to the most tyrannical despotism, he succeeded, by the beginning of April, in collecting a large force on the banks of the Elbe, though that force was of a very different description from the veteran army which he had lost in Russia. His cavalry and artillery were particularly inferior; and it was on these two branches, especially the artillery, that the French used to depend for their victories; it is even said that, in consequence of his having lost upwards of 1000 pieces of cannon in Russia, he was under the necessity of supplying his army, in a great measure, with cannon from the ships at Antwerp, which were, of course, of a description by no means suited for military purposes.

Before Bonaparte left Paris, to take the command of his army, he judged it expedient to settle the form of a provisional government during his absence: he had so narrowly escaped destruction in his Russian campaign, at a time when he had taken no measures respecting the government of France while the king of Rome was a minor, that he resolved to guard against all accidents for the future. Accordingly his empress was regularly declared regent during his absence; and the king of Rome was nominated, in a more solemn manner than heretofore, his successor. It is probable that the appointment of the empress as regent had other objects in view; Bonaparte knew well the temper and disposition of the Parisians; he knew that the best mode of drawing off their thoughts and speculations from the disasters that had occurred, or might occur, was by keeping up the splendour, bustle, and pageantry, of a court; and this could be done with the best effect by investing his empress with the name and dignity of regent. Having thus taken what he conceived to be all due precautions, and sent on before him immense bodies of troops, he closed the session of the legislative body in a speech full of his usual confidence and haughtiness, in which he led them and the French nation to expect, that on the banks of the Elbe he should regain all those laurels which he had lost amidst the snows of Russia.

Having thus detailed the preparations which Bonaparte made for the commencement of what has been denominated the German campaign, we must notice briefly the preparations of those powers who were to oppose him. Alexander, at the head of his army, advanced with great rapidity into the north of Germany. As soon as he crossed his own boundaries into those of Prussia, he ordered a declaration to be issued, explanatory of his motives and views. The Russian emperor was every where hailed as a deliverer, and upon his entrance into Berlin he was received with the utmost enthusiasm by all ranks of the people, and in the end Prussia became a noble ally to the northern potentate. She was indeed destined to act a conspicuous part in avenging her own wrongs and those of Germany. Her armies were put on the best footing. Blucher, who had already immortalized himself by his conduct, had a leading and extensive command; and it seems to have been the wise policy of the continental sovereigns, in this last struggle for their independence, to select those generals against whom Bonaparte had displayed the greatest rancour; they thus secured themselves from treachery, while they called forth all the talents of their commanders. Besides the regular army of Prussia, the landwehr or militia were called out; all were anxious to be enrolled to co-operate in the deliverance and defence of their country.

In the mean time the Russian army continued to advance, and having liberated great part of Prussia, directed their efforts towards the emancipation of Saxony. Count Wittgenstein, who commanded the Russian army, addressed to the

Saxons a most noble and inspiring proclamation, which, though it probably made a deep impression, did not, at the time, produce the consequences which the Russian general anticipated. The king of Saxony was with the French, and no small part of their country was occupied by those people, circumstances which naturally prevented many from joining the allies whose wishes were cordially with them; when, however, an opportunity did occur, it will be seen that the Saxons proved themselves worthy of the name of Germans, and of their ancestors. A hope was now excited that Bernadotte, the crown prince of Sweden, and his numerous army, would be brought to act in favour of the allies; this expectation was considerably strengthened by treaties which were concluded between the courts of Sweden, Russia, and Great Britain. By these treaties, the army under the crown prince was immediately to be employed in the common cause, and in return for his accession of force, Great Britain, besides granting a subsidy to Sweden, agreed to give up to her the island of Guadaloupe, and to guarantee the kingdom of Norway when it should be conquered from the Danes.

Thus it was known that early in the year 1813, Great Britain, Russia, Prussia, and Sweden, were decidedly against France. Hostilities commenced, and in many parts the French were decidedly victorious; Hamburg, and many other places in the north of Germany, fell into their hands. The first great battle in which Bonaparte was himself engaged, was at Lutzen, on the 1st of May; the Prussians, having partially succeeded in breaking into the squares of the enemy, committed great carnage, and the conflict on all sides was most desperate and sanguinary. For a considerable time the allies were the assailants, but towards evening, Bonaparte called in that division of his army which was near Leipzig, and collecting all his reserves, made a most furious attack, for which the allies were not prepared; night however put an end to the combat. The allies remained masters of the field that evening, but judged it prudent, early on the next day, to commence a retreat, in consequence of which Bonaparte claimed the victory in the battle of Lutzen. But it was not such a victory as he used formerly to boast of; and on the 21st of May another bloody battle was fought at Bautzen, which was still in favour of the French, and the allies again found it expedient to retreat. The loss of the enemy in this obstinate battle was very severe; though Bonaparte gained ground by it, he gained it at such an expence of men, and with such a conviction of the bravery and skill of the allies, that he must have been very unwilling to have obtained many such victories. But the most alarming circumstance which occurred during the battle of Bautzen, was the desertion of a whole battalion of Wurtembergers, as well as a body of Saxon troops, which must have convinced Bonaparte how little dependence he could place on the German troops. The allies continued their retreat, and on the 24th of May their head quarters were within 18 leagues of Berlin. On the 4th of June, through the mediation of the emperor of Austria, an armistice was agreed on, which was to continue till the 20th of July. It was a matter of great difficulty to determine on which side the advantage of this armistice lay; both parties were probably desirous of it, and as the emperor of Austria pressed it most earnestly, each party readily agreed to it, in the hope of gaining his assistance, or avoiding his hostility. It was, however, extremely unpopular throughout Germany, and especially in the Prussian states; so much so, that the king deemed it necessary to issue a proclamation, in which he declared that the armistice had not been fought for by the allied powers, and that they would

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only use it to re-inforce their armies, and attack the common enemy, at its expiration, with more vigour. Bonaparte, on his own part, complained that the terms of the armistice were not faithfully kept by the allies; this complaint, which was well founded, arose from a circumstance which augured fatally for his future success; for the landwehr of Prussia, and even all the inhabitants who could procure any kind of arms, notwithstanding the suspension of hostilities, were continually attacking and harassing the French, and in many cases they captured their supplies of stores and provisions, and rendered precarious and difficult their communication with France.

It was soon evident that the armistice would not lead to peace, each party was exerting itself to the utmost to recruit and re-inforce their army. The emperor Alexander ordered fresh troops to be brought across the Vistula, and in a short time the re-inforcements that joined the allied army from Russia alone, amounted to 75,000 men. The king of Prussia contributed as much to the common cause as the exhausted state of his country, and of its finances, would allow. Bonaparte was equally active; opposite to the main army of the allies he had collected nearly 130,000 men.

The armistice was prolonged till the middle of August, during which a congress was held at Prague, at which little or nothing was done, or perhaps even attempted. The mediation of the emperor of Austria was of no avail; the terms which he proposed as just and equitable to all parties, were peremptorily rejected by Bonaparte. No alternative, therefore, he said, remained for him to adopt, but to unite his forces with those of the emperor of Russia and the king of Prussia. Still, however, he, as well as they, were going to fight, not for the purposes of ambition or conquest, but solely for the attainment of a just, honourable, and lasting peace. As soon as this could be brought about, they would most cheerfully lay down their arms; but till it was brought about, they would continue united in hostilities, and exert themselves to the utmost.

Russia, Austria, Prussia, and Sweden, were now to try their strength against France; the jealousies and selfishness of the allied sovereigns, which had rendered former coalitions of no value, were absorbed in the deep and awful conviction that now they were fighting for their own existence; besides, in the former contests, they were averse from, or indifferent to, the cause of their sovereign; now they were cordial and zealous in their co-operation. The allied powers also very wisely made use of other weapons than those of warfare; the most eloquent and popular writers in Germany were employed to rouse the people, to hold out Bonaparte as no longer formidable; as having been conquered; but still as the implacable enemy of the happiness and peace of Germany, as the common destroyer of the liberty of the sovereign and the peasant.

Besides the crown prince of Sweden, another Frenchman entered into the lists against Bonaparte, viz. general Moreau, who, after he had been liberated by him, had gone over to America, where, in peace, quiet, and retirement, he had spent some years of his life. It is not known by what particular motives he was induced to enter again into public service; but it appears that the emperor Alexander, as soon as he found that war with Bonaparte was inevitable, sent over a confidential person to America, with whom general Moreau returned to Europe. He joined the allied army soon after the congress at the Prague was dissolved.

On the 17th of August hostilities recommenced, and a most severe battle was, a few days after, fought at Dresden, in which, after a terrible slaughter on both sides, the French succeeded in repulsing the allied armies, but the most dis-

astrous event in the course of this battle was, the death of Moreau, who had both his legs shot off by a cannon ball.

Bonaparte represented the battle of Dresden as most decidedly favourable to him, and he probably considered the loss and discomfiture of the allies as much more serious than they really were, as in order to intercept their retreat into Bohemia, he dispatched Vandamme, one of his generals, with a force which it would have been madness to have sent against them, had he not believed their army to have been not only much reduced in numbers, but retreating in great disorder. In the attack, Vandamme, and six other generals, were taken prisoners, besides 10,000 men, 60 pieces of artillery, and 6 standards.

In Silesia the campaign opened on the 18th of August, the allies in this quarter moving on towards Dresden; they first attacked and defeated a corps under marshal Ney, which induced Bonaparte to set out to re-inforce his general; the French having now greatly the superiority, general Blucher retreated, and took up a strong position behind the Katzbach. The plan of the allies being to distract and divide Bonaparte's forces, they fell farther back, while the grand army from Bohemia, as we have seen, marched on to Dresden, and drew off Bonaparte to that quarter. On the 25th and 26th the French advanced against Blucher, but on the latter of those days the Prussian general attacked them. The battle was fought near the Katzbach, and from that takes its name; in it Blucher and the Prussians proved their determination to avenge the disgrace which their country had so long suffered by having been under the tyranny of France. They fought with the most unparalleled bravery, and gained a complete victory. Among the fruits of their spoil were 18,000 prisoners, 103 pieces of cannon, and 280 ammunition waggons. In another quarter the crown prince was likewise victorious over the French; and in a second battle, viz. that of Juterbock, it was calculated that the vanquished French had lost from 16 to 18,000 men, more than 50 pieces of cannon, and 400 ammunition waggons.

After these defeats the situation of Bonaparte became more critical, yet he still remained at Dresden, and continued there till the 7th of October, when he quitted it, taking with him the royal family of Saxony. Hitherto the allies of Bonaparte had remained more faithful to him than might have been expected, but about this period the king of Bavaria deserted him, and concluded a treaty of alliance and concert with Austria, by which 35,000 Bavarian troops were immediately to co-operate with those of Austria.

On the 14th of October Bonaparte collected his whole force in and round Leipzig, and on the 18th the famous battle of Leipzig was fought, in the course of which two Saxon battalions, and two Westphalian regiments of hussars, quitted the ranks of the enemy and joined the allies; the artillery which they brought over with them, they immediately turned against the French, and the crown prince headed the men in a charge against their former oppressors. In the battle of this day the French lost at least 50,000 men in killed, wounded, and prisoners, besides 65 pieces of artillery. Bonaparte now left Leipzig, and in two hours afterwards the allied armies entered that town.

The retreat of Bonaparte from Leipzig with the wreck of his army, to the amount of 80,000 men, was scarcely surpassed in disorder and misery by his retreat from Moscow. As soon as he reached the Rhine he left his army, hastened to Paris, and on his arrival, another conscription of 300,000 men was ordered, but France was now too much exhausted to answer the demand; the Russian and German campaigns had almost entirely stripped her of the efficient military population; besides, there was wanting that enthusiasm which had,

twenty years before, been characteristic of the country, so that it was almost deaf to this new demand.

In the mean time the mighty edifice which Bonaparte had erected out of the ruins of the independence and liberties of the continent, and which had been cemented by the blood of hundreds of thousands, was falling to pieces; the victory of Leipsic, by freeing the minds of the princes of Germany from all apprehensions of his power, proved how eager they were to resume their legitimate character and authority. Wurtemburgh deserted him, and made her peace with the allies; and the confederation of the Rhine was dissolved; so that, to use his own words, no sovereigns remained attached to him except the king of Denmark and the king of Naples.

Holland, which had long groaned under French tyranny, early in the month of November broke her shackles, dismissed the constituted authorities, established a provisional form of government, and by the assistance of Great Britain she was at length enabled to hold up her head as a free and independent nation, recalling her hereditary prince, and investing him with new powers, and higher titles than the members of the house of Orange had formerly exercised and claimed. Rather before this period the allied troops, under the command of the crown prince, had entered Hanover, which they liberated from French thralldom, much to the satisfaction of the inhabitants, and by the end of November almost all the strong places between the Elbe and the Rhine were in possession of the allies, and such as were not, were closely invested. On the 11th of December they issued their famous proclamation, which, from its justice and moderation, probably did them as much, or more, service, than any of their victories. "The allied powers," say they, "do not make war upon France, but against that preponderance which, to the misfortune of Europe and of France, the emperor Napoleon has too long exercised beyond the limits of his empire.

"Victory has conducted the allied armies to the banks of the Rhine. The first use which their imperial and royal majesties have made of victory, has been to offer peace to his majesty the emperor of the French. An attitude strengthened by the accession of all the sovereigns and princes of Germany has had no influence on the conditions of that peace. These conditions are founded on the independence of the French empire, as well as on the independence of the other states of Europe. The views of the powers are just in their object, generous and liberal in their application, giving security to all, honourable to each.

"The allied sovereigns desire that France may be great, powerful, and happy; because the French power, in a state of greatness and strength, is one of the foundations of the social edifice of Europe. They wish that France may be happy, that French commerce may revive, that the arts (those blessings of peace) may again flourish, because a great people can only be tranquil in proportion as it is happy. The allied powers confirm to the French empire an extent of territory which France, under her kings, never knew; because a valiant nation does not fall from its rank, by having in its turn experienced reverses in an obstinate and sanguinary contest, in which it has fought with its accustomed bravery."

Immediately after the issuing of this declaration, the allies having completed their arrangements, crossed the Rhine for the purpose of invading France; as, however, the strong fortresses near Mentz rendered the passage in this place rather difficult, they preferred passing through Switzerland, by the inhabitants of which country they were hailed as friends, and afforded every assistance.

The allied army entered Switzerland on the 20th of December, penetrated to Zurich and Berne, and crossed the Rhine at Basle without firing a shot, and before the end of the year detachments of the allies made their way to Langres, in Champagne, which was about 100 miles within the old French frontier. The year 1814 opened with an invasion of France, not only by the allies in the east and north, but on the south by lord Wellington, while the Austrian forces in Italy, aided by the naval exertions of Great Britain, and by detachments from our garrisons in the Mediterranean, completely kept the viceroy in check. Every event tended to shew that Bonaparte's power was tottering, and he must have been convinced that he had only one thing to depend on, *viz.* his own personal prowess. He accordingly left Paris on the 25th of January to take command of the armies, and on the 1st of February a great battle was fought between him and marshal Blucher, which was decided in favour of the allies, and the retreat of Napoleon from his positions about Brienne, with the loss of 4000 prisoners, was the consequence of his defeat.

On the 7th of February the position and town of Troyes was taken possession of by the allies; this town was thought to be of great importance to their cause, on account of its resources, its population, and of the number of roads leading to it from different parts of France. At this period negotiations were carrying on at Chatillon-sur Seine for the purpose of effecting a peace, during which the allies had gained several conquests over the French armies. Bonaparte had been beaten in several engagements with Blucher and prince Schwartzburg, whose armies, at the close of February, were at Troyes and Chalons, while he himself was at Rheims. On the 19th of March the negotiations were to terminate, and on that day Napoleon refused the terms that were offered him, though by those terms he would have continued at the head of the French, with dominions as extensive and powerful as had ever been enjoyed by any of the former monarchs.

On the day that the conferences at Chatillon were terminated, the French army moved upon Arcis, behind which the corps commanded by field marshal count Wrede was posted.

The allies, under Schwartzburg, concentrated on the Aube, near Pougy and Arcis, and a general attack was made by the allies on the 20th, in which the enemy was defeated at all points, with great loss, and Arcis was taken.

At this juncture, Napoleon formed the desperate and extraordinary plan of passing between the two armies of the allies, and of striking at their communications with the Rhine, intending at the same time to liberate the garrison of Metz. For this purpose he moved by Chalons on Vitry and St. Dizier, his head-quarters being, on the 22d, at Obcomte, between the two latter places. This bold and characteristic resolution was formed in the expectation that it would alarm the allies so much for their own safety, as not only to draw them away from Paris, but actually entangle them in the very difficulties with the prospect of which he endeavoured to terrify them;—this movement was fortunately defeated by their resolution of marching upon Paris, a resolution which was—considering the time and circumstances in which it was taken—one of the grandest that ever entered into the mind of man, and does the highest honour to the names of the emperor Alexander and prince Schwartzburg;—to which of those great men the idea suggested itself, perhaps they themselves are not conscious; but it is certain they both eagerly adopted it, and must equally share in the glory of that great enterprise in which they risked themselves and their armies for the deliverance of mankind.

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For two days after this determination and change of march, Bonaparte was employed, as he hoped, in anticipating the allies, and in preparing the springs in which his victims were to be caught; but no enemy came—no intelligence arrived: from Paris he heard nothing—from the rest of France little; and a hostile army of 200,000 men must be, he knew, at no great distance from him, but he could not guess where. Over Winzingerode, who was in his vicinity, near St. Dizier, with a small force, he obtained some, and claimed greater advantages; but these successes left him as much in the dark as ever.

He was convinced that this corps was but the advanced guard of the Russians; and when one of his generals reported it was not so, and that the main body of the allies had suspended their retreat, he himself thought the news almost too good to be believed, and calculated that the time thus lost would enable him to perfect his plans for their destruction.

In these circumstances, it was Napoleon who thought his enemies undone; and far from considering them as having refused the offensive, he saw in their movement of concentration only a measure of retreat. He announced it triumphantly to the empress in letters written with his own hand: these letters were intercepted by the allies. They were then certain of having deceived him, and they urged with great precipitation their movement against the capital.

Of the march upon Paris either he never thought, or his arrogance hastily rejected the idea; but at last, after a loss of three days, he felt that it became absolutely necessary to ascertain the enemy's position, and he accordingly hastened by forced marches through Bar-sur-Aube towards Troyes. A junction was, however, formed by prince Schwartzburg and marshal Blucher; and the whole allied force marched upon Paris, with a rapidity that insured its success. The defences which had been raised in the neighbourhood of that city were attacked late in the day of the 30th March, and the enemy, under the command of Marmont, made a most determined resistance; but the allies were almost every where successful.

At the moment of these decisive advantages, a flag of truce was sent from Marmont, intimating a desire to receive any propositions that it might have been intended to make to him by a flag of truce, which had previously been refused admittance. An armistice was also proposed by him for two hours; to obtain which, he consented to abandon every position he occupied without the barriers of Paris.

On the 31st in the morning, the allies entered Paris. In the evening, Caulincourt came from Bonaparte to the emperor of Russia, offering to accede to the terms of peace which the allies had offered at Chatillon. The emperor gave no other answer, than that the time was past for treating with Bonaparte as sovereign of France.

Immediately, by the desire of the emperor of Russia, the senate met, and chose a provisional government, consisting of Talleyrand and four other members. At their second sitting, they declared that Bonaparte had forfeited his right to the empire, and that his dynasty was at an end. They also resolved, that the senate and legislative bodies should form fundamental parts of the new constitution.

On the 1st of April the provisional government installed itself, and of this Bonaparte seems to have been aware; and on the 2d he collected at Corbeil, Fontainebleau, and the neighbourhood, at least 20,000 men, whom he reviewed and thus addressed: "The enemy is in Paris. I do not wish to speak of the inhabitants of that city, but a horde of emigrants, whom I had recalled, restored, and laden

with personal favours, have offered their services to the emperor of Russia, and have hoisted the white cockade. The tri-coloured cockade we won in our revolution; we have ennobled it in our empire. It has shared too many triumphs with us ever to be abandoned. If Paris is to be retaken at the point of the bayonet, I will march at your head. May I reckon upon you? Am I right? Will you ever abandon this national cockade?" "Never, never; vive l'empereur! vive Napoleon! à Paris!" was the answer of the whole line of troops.

The marshals present at this scene were far from partaking or encouraging this enthusiasm: they that same night assembled in the palace, and when admitted to Napoleon's presence, with many references to their former services, and professions of duty and affection, acquainted him that all was lost; that at most he could collect but 56,000 men, and that for them he had not two days provisions; but the only means of saving any thing from this great shipwreck, was to abdicate in favour of the king of Rome.

Bonaparte, for the first time in his existence, heard a remonstrance in silence, and ultimately assented to the proposal. On the 3d, marshal Ney put into his hands the Paris journals, in which the déchéance, pronounced by the senate the day before, was published; and, in the name of his brethren, on the public parade, gave him that advice so terrible to the ear of a tyrant, "Sire, il faut abdiquer; c'est le vœu de la France et de l'armée." Napoleon, thunderstruck, retired into the palace. On the 4th he signed his own abdication, and addressed an order of the day to his army, in which, after contrasting forcibly and justly the former fervility and present tergiversation of the senate, he intimates, that if he is the only obstacle to peace, he is ready to make the last sacrifice for France; and that he has sent Ney, Caulincourt, and Macdonald to Paris, "pour entamer des négociations." These negotiations, which had for their object the continuance of Bonaparte's power under the cloak of a regency, to be administered by his wife, in her own name, or that of her son, happily failed. Others then ensued, in which the discussions were not questions of policy, power, or government, but of pounds, shillings, and pence; and on the 11th of April was signed the famous treaty, by which Bonaparte abandoned for himself and his family the thrones of half the world, and stipulated only for the empty titles of his better days, a retreat in the obscurest corner of his late dominions, and a pension of 2,000,000 of livres *per annum* from the civil list of Lewis XVIII.; and, finally, on the 12th he signed the formal instrument of his abdication on the part of himself and his dynasty.

Such was the termination of this disastrous revolution; and in a very few weeks after the deposition of Bonaparte, Lewis XVIII. returned, and took a quiet possession of the throne of his fathers. Of the stability of the new government we presume to offer no conjectures. Of the character of the present sovereign much might be said in applause; of the new constitution, at present, we know but little: and into what it may ultimately settle it is difficult to speak. Many recent occurrences in different parts of Europe have mortified the friends to human happiness; the society of Jesuits, always inimical to the interests of mankind, has been re-established. The Inquisition, which Bonaparte abolished, and which it was imagined could, in this enlightened age, never more rear its horrid head, has been revived in Spain, to the everlasting disgrace of the prince who ordered its establishment, and to the people who permitted it. When we read the decree, that "the

tribunal of the Inquisition is abolished, as derogatory to the sovereign power, and to civil authority," we did anticipate a new era, even for Spain, and are mortified, beyond the power of language to describe, to find that several of the best and most virtuous inhabitants of that country are now suffering under a tribunal which cursed the world for so many centuries, which, for the boldness and wickedness of the original conception, the immense extent of its power, the audacity of its attempts, the greatness of its success, and the length of its domination, finds no parallel in the records of the world.

We might, as a conclusion to this article, take some notice of the principal actors and sufferers in the revolution which we have been contemplating, but we are afraid of transgressing the allowed limits. Besides, in our alphabetical arrangement, we have already noticed several of the most distinguished of these persons; see particularly the articles BAILLY, CONDORCET, MARAT, MIRABEAU, LEWIS XVI., MALESHERBES, and NECKER, and to some others, according to the plan of our work, distinct articles will hereafter be given. (See ROLAND-TURGOT, ROBESPIERRE, VERGIGNAUD, &c.) Of Danton, who took a very active part in some of the bloodiest scenes in Paris, and who fell a victim to the axe which he had sharpened for others, we may observe, that he was educated to the law, and in the progress of the revolution was successively the associate of Mirabeau, Marat, and Robespierre. He organized some of the chief tumults and massacres in the city, particularly that of the 10th of August. After the fall of royalty, he obtained an appointment of administrator of justice, a station in which money poured on him from all sides, and which was speedily distributed by him to procure adherents and reward atrocities. He was deeply involved in the horrid massacres of September, and, when subsequently called to account for the distribution of the money charged for secret service, he declared, that "in a revolution there could be no reckoning in detail." It was Danton who prevented the national assembly from leaving Paris on the approach of the Prussians. He was brought to the guillotine by Robespierre, who was his rival, but his inferior in every thing but cunning and hypocrisy. For this article, we refer, as authorities, chiefly to the volumes of the *New Annual Register*.

REVOLUTION of America. See AMERICA, and UNITED STATES.

REVOLUTION in Poland. See POLAND.

REVOLUTION, in Geometry. The motion of any figure quite round a fixed line, as an axis, is called the revolution of that figure; and the figure so moving is said to revolve.

Thus, a right-angled triangle, revolving round one of its legs, as an axis, generates, by that revolution, a *cone*; which see.

REVOLUTION, in Astronomy, denotes the period of a star, planet, comet, or other phenomenon; or its course from any point of its orbit, till it return to the same.

The planets have a twofold revolution. The one about their own axis, usually called their *diurnal* rotation, which constitutes what we call their *day*.

The other about the sun, called their *annual* revolution or *period*, constituting their year. See *Motion of the PLANETS*.

REVOLUTUM FOLIUM, in Botany. See LEAF.

REUS, in *Geography*, a town of Spain, in Catalonia, where several merchants at Barcelona have agents for the purchase of wine, brandy, and fruit, with which the country abounds.

REUSS, a river that rises from a lake in Mount St.

Gothard, crosses the canton of Uri, passes through the lake of the Four Cantons to Lucerne, and then taking a northerly course, runs into the Rhine, two miles N. of Klingnan, in the county of Baden.

REUSSEN, a princely county of Saxony, divided into several branches, which take their names from the towns which they possess, all situated in the Vogtland.

REUSSIN, or REDZEN, a town of the duchy of Warsaw; 40 miles S.S.W. of Posen.

REUT, a town of Bavaria, in the bishopric of Bamberg; three miles E. of Forcheim.—Also, a river of European Turkey, which runs into the Dniester, near Ustia, in the province of Moldavia.

REUTELE, in *Ichthyology*, a name used by some for the *umbla minor*, or red charr, a fish common in the lakes of Germany, and of the northern parts of England and Wales. The name is originally German.

REUTLINGEN, in *Geography*, a town of Wurtemberg, on a small river, which runs into the Neckar. It has only one parochial church, together with one hospital, an orphan-house, and a grammar-school. The magistrates and burghers are Lutherans. Near it was discovered, in 1716, a sulphurous spring; 32 miles W. of Ulm. N. lat. 48° 30'. E. long. 9° 8'.

REUTO, a town of Saxony, in the Vogtland; 6 miles W.S.W. of Plauen.

REUTTE, a town of Germany, in the county of Bregentz; 9 miles S.S.E. of Bregentz.

REUTTEN, or REITA, a town of the Tyrolse, on the borders of Swabia; 32 miles N.W. of Inspruck.

REVULSION, in *Medicine*, the derivation of the fluids of the body, from a part in which they are morbidly accumulated, to another part, whether near or distant.

This principle is much acted upon in the practice of medicine, although considerably less than by the advocates of the humoral pathology. These practitioners carried the principle so far as to make their evacuations generally at some point opposite and distant to the part diseased; thus, to relieve the head, they would bleed from the foot, or from the hæmorrhoidal veins about the anus; and if a pleurisy occurred in the left side, they would open a vein in the right arm; and so forth. These were mere hypothetical refinements, and have fallen into disuse in this country. Much of the practice of medicine, however, in acute and in some local chronic diseases, hinges upon the principle of revulsion. Thus, for the removal of inflammatory congestion in any internal organ, as in the lungs or brain, a counter-inflammation is excited externally in the skin of a contiguous part, by applying a blister, or a stimulating liniment, to the surface of the chest, to the neck, or on the scalp; and thus by bringing an afflux of the fluids to these external parts, which are of less importance to life, the congestion in the vessels of the more important and vital organs is diminished, and the inflammation cured. In a similar manner, the derivation of the fluids to the intestines by cathartic medicines, to the kidneys by diuretics, and to the skin by sudorifics, tends to diminish the congestion of the circulating system at large, and consequently of particular organs. Blood-letting, whether by directly opening the veins and small arteries, or by the application of leeches, or of cupping-glasses after scarification, likewise operates upon the principle of revulsion.

Considerable errors, however, have been committed, especially by the humoral pathologists, by carrying this doctrine too far. For in their attempts to procure evacuations of the fluids, especially from the skin, they have employed heat, and ammoniacal, spirituous, and other stimulant medicines, which, by the excitement and irritation which they

occasioned in the nervous and vascular system, produced much more inflammatory action, than the revulsion, resulting from the evacuation, could possibly subdue. See *HUMORAL Pathology*.

REVULSION is also used for a spontaneous turn or reflux of humours in the body. Sudden diseases are occasioned by great revulsions of humours, which fall all at once on certain parts.

REWAH, in *Geography*, a town of Hindoostan, in the country of Allahabad; 57 miles S.S.W. of Allahabad. N. lat. $24^{\circ} 35'$. E. long. $81^{\circ} 36'$.

REWARDS. Military rewards, among the Athenians, consisted sometimes in crowns presented to those that had merited them; on which their names and noble actions were inscribed. Some had leave granted them to erect pillars or statues in honour of some god, with inscriptions setting forth their victories. This was a favour that was seldom granted; Cinon indeed was honoured with it, but Themistocles could never obtain the like. Another honour conferred at Athens on the valiant, was to have their arms placed in the citadel, and to be called *Cecropidae*, or citizens of the true old blood. Others were presented with a *παραποικία*, or complete suit of armour. Songs of triumph were honorary compliments paid to some. The children of those who were killed in battle were maintained at the public expence, till they came to maturity; at which time they were presented before the assembly of the Athenian people with a complete suit of armour, one of the public ministers proclaiming before them, "that hitherto, in remembrance of their fathers' merits, the commonwealth had educated these young men, but now dismissed them so armed, to go forth and thank their country by imitating their fathers' examples."

Solon made a farther provision for the parents of those that died in the wars, it being extremely reasonable that they should be maintained at the public expence, who had lost their children, the comfort and support of their declining age, in the service of the public.

As for those who were any wise disabled, they had an allowance from the public towards their maintenance. Potter, vol. ii.

Triumphal honours were reckoned among the military rewards which the ancients voted to their best generals. Fabius Maximus, Paul Emilius, Camillus, and the Scipios, were satisfied with this recompence for their services. With respect to old infirm soldiers, who were invalided, they were provided for by receiving, each, a lot of ground, which they cultivated and improved. Lands, thus appropriated, formed part of the republican or national domains, or were divided amongst them in the conquered countries.

The Roman officer was rewarded for his services, or for particular acts of bravery, in three ways: 1st. By marks of honour or distinction, which consisted of two sorts, viz. of that which was merely ornamental to their own persons, or limited to the investiture for life; and of that which may be called *rememorative*, such as statues, &c. The latter descended to their posterity, and gave their families a certain rank in the republic. 2dly. By pensions or allowances. And 3dly. By a grant of lands which exceeded the lots given to private soldiers.

The French, who got possession of the country which was formerly occupied by the Gauls, had, at first, no other method of recompensing their generals than by giving them a certain proportion of land. This grant did not exceed their natural lives, and sometimes it was limited to the time they remained in the service.

These usages insensibly changed, and by degrees it became customary for the children of such men as had received

grants of national territory, to continue to enjoy them; upon condition, however, that the actual possessors of such lands should be liable to military service. Hence the origin of fiefs in France, and the consequent appellation of *milice des fiefes*, or militia, composed of men who held their lands on condition of bearing arms when called upon. The French armies were for many years constituted in this manner; and the custom of rendering military service in consideration of land tenure, only ceased under Charles VII.

In process of time, those lands which had been originally bestowed upon men of military merit, descended to their children, and were gradually lost in the aggregate lots of inheritable property. Other means were consequently to be resorted to by the state, in order to satisfy the just claims of deserving officers and soldiers. The French, therefore, returned to the ancient custom of the Romans, and rewarded those, who distinguished themselves in war, by honorary marks of distinction.

Honorary rewards and compensations for service were not confined to individual officers and soldiers. Whole corps were frequently distinguished in the same manner. When several corps acted together, and one amongst them gave signal proofs of gallantry and good conduct, that one frequently took precedence of the others in rank, or was selected by the sovereign to be his personal guard. Sometimes, indeed, the king placed himself at the head of such a corps on the day of battle, thereby testifying his approbation of their conduct, and giving a proof of his confidence in their bravery.

It is now usual, in most countries, to confer marks of distinction on those corps that have formed part of any army that has signalized itself. Thus the kettle-drums, under the appellation of *nacaires*, were given to some regiments, as proofs of their having behaved gallantly on trying occasions.

The military order of St. Louis, which was created by Louis XIV. in 1693, and that of Maria Theresa, as well as many other orders in different countries, were only instituted for the purpose of rewarding military merit. The establishment of hospitals for invalids, such as Chelsea, &c. owes its origin and continuance to the same just sense of what is due to deserving officers and soldiers. Hence, likewise, our invalid companies and retired lists.

Philip Augustus, king of France, first formed the design of building a college for soldiers who had been rendered infirm, or were grown old in the service. Louis, surnamed the Great, not only adopted the idea, but completed the plan in a grand and magnificent style. Charles II. on his restoration to the crown of Great Britain, established Chelsea, and James II. added considerable improvements to this royal institution. During the present reign, military merit has been rewarded by titles and pensions; but, what is still more creditable to the government, and reflects honour upon his royal highness the duke of York (for his co-operation with those who originally suggested the idea) old and meritorious soldiers are taught to expect a secure retreat in the decline of life; and every rank is provided for according to the claims and services of individuals.

REWARDS, in a *legal sense*. There are rewards given in many cases, by statute, for the apprehending of criminals, and bringing them to justice; as a reward of 40*l.* to those who apprehend robbers on the highway, and prosecute them to conviction, by 4 & 5 W. & M. c. 8, to be paid to them (or, if killed in the endeavour to take them, their executors) by the sheriff of the county; to which the statute 8 Geo. II. c. 16. superadds 10*l.* to be paid by the hundred indemnified by such taking. Also the like reward of 40*l.* for apprehending

hending and prosecuting of burglars. Stat. 5 Ann. cap. 31. See LARCENY.

The same reward for apprehending of money-coiners, or clippers, &c. 6 & 7 W. III. And the like reward for the apprehension of thief-takers, not prosecuting felons; and of persons resisting the officers of the customs, by force of arms, &c. 6 Geo. I. cap. 20. 22. See DISCOVERY of Accomplishes.

REWARI, in *Geography*, a circar of Hindoostan, in the Subah of Delhi, between Ballogistan on the N. and Mewat on the S.—Also, a town of Hindoostan, and capital of the forementioned circar; 48 miles S.W. of Delhi. N. lat. 28° 13'. E. long. 36° 52'.

REWEY, a term among *Clothiers*, signifying cloth unevenly wrought, or fall of *rewes*. 43 Eliz. cap. 10.

REX AMARORIS, in *Botany*, Rumph. Amboin. v. 2. 129. t. 41, a shrub or tree, so called on account of its supreme bitterness, as well as its reputed medical virtues. The natives of Ternate, according to Rumphius, esteem it a perfect panacea. In cholera, pleurisy, and various kinds of fevers, it is particularly recommended. The fruit, of a compressed heart-like shape, and coriaceous texture, is cut into small pieces, and chewed with Betle-nut. Its excessive bitterness causes a nausea, supposed to be beneficial to the patient. Linnæus cites the above chapter of Rumphius, in his *Syst. Veg.* under *Ophioxylon*, but incorrectly, *Rex amoris*. A specimen of the true plant is found in his herbarium, but it has no affinity to *Ophioxylon*. We have a more perfect specimen, gathered in the island of Honimoa, by the late Mr. Christopher Smith, in March 1797, by which the plant seems to belong to *Pentandria Digynia*. The leaves are elliptical, entire, a span long, alternate, on long stalks; their under sides silky, especially when young; with one stout midrib, and many straight parallel transverse veins. Flowers very small, in numerous, simple, silky, axillary, solitary clusters. Calyx minute, apparently of only two acute leaves. Petals five, larger than the calyx, uniform, oblong, concave, at length reflexed. Stamens awl-shaped, simple. Anthers roundish, simple, two-lobed. Germen superior, obovate, compressed, cloven at the top. Styles none. Stigmas obtuse, converging. The ripe fruit we have not seen. Rumphius says it consists of two cells, with a white seed, like that of a cucumber, in each. The foliage bears considerable resemblance to some of the *Contortæ*, but there is no character of that tribe in the fructification; as far, at least, as we can discern. The germen and stigmas are not unlike those of *Ulmus*. The half-formed fruit proves intensely bitter, as soon as it is put into the mouth.

REX *Minstrelorum*, king of the minstrels. About the year 1330, the minstrels of Paris formed themselves into a company, and obtained a charter. The police frequently repressed their licentiousness, and regulated their conduct. Philip Augustus banished them the first year of his reign; but they were recalled by his successors, and united under the general name of *menestraudie*, minstrelly; having a chief appointed over them who was called king of the minstrels. Lewis IX. exempted them from a tariff or toll at the entrance into Paris, on condition that they would sing a song, and make their monkies dance to the tollman, perhaps to prove their title to such indulgence; and hence arose the well-known proverb, “Payer en gambades et en monnoie de finge.”

The associated minstrels inhabited a particular street, to which they gave the name, which it still retains, of St. Julien des Menestriers. It was here that the public were provided with musicians for weddings, and parties of pleasure; but as a greater number of them usually attended on such occasions

than were ordered, and all expected to be paid the same price, William de Germont, provost of Paris, in 1331 prohibited the jongleurs and jongleresses from going to the se who required their performance in greater numbers than had been stipulated, upon a severe penalty. In 1395 their libertinism and immoralities again incurred the censure of government, by which it was strictly enjoined that they should henceforth, neither in public nor private, speak, act, or sing any thing that was indecorous or unfit for modest eyes and ears, upon pain of two months' imprisonment, and living on bread and water.

In the reign of Charles VI. they seem to have relinquished the juggling art, and to have confined themselves more particularly to the practice of music. It was about this time that treble and base rebees, or viols with three strings, began to be in use, either to play in octaves to each other, or perhaps in a coarse kind of counterpoint, of which the laws were now forming: on this occasion the minstrels assumed the title of players on high and low instruments (*joueurs des instrumens tant haut comme bas*), which seems to imply treble and base instruments. And the charter under this denomination was confirmed in 1401.

REX *Mullorum*, in *Ichthyology*, a name given by some authors to a species of mullet, distinguished from all the others by its having a prominent belly, and having no beards under the mouth.

REX *Sacrificulus*, the *King-priest*, in *Mythology*, was instituted, after the expulsion of the kings of Rome, to perpetuate the memory, according to Dionysius Halicarnassens, of the great services some of their kings had done to Rome. A law was made, that the pontiffs and augurs should choose one of the oldest to have the charge of divine worship; but for fear that the name of king should again create jealousy, it was appointed at the same time, that the rex sacrificulus should be subject to the high priest. He had likewise the name of “Rex Sacrorum,” and his wife that of “Regina Sacrorum.” The first person that was chosen under this appellation, after the expulsion of the Tarquins, was Maxim Papius, of Patrician extraction.

REX, in *Ornithology*, a species of *Turdus*; which see.

REX *Vulturum*. See VULTUR *Papa*.

REY, in *Geography*, a town of Persia, in the province of Irak, called *Rae*; which see.

REY, a river of England, in Wiltshire, which runs into the Thames, near Cricklade.

REY *Isle*, a small island in the bay of Panama. N. lat. 8°. W. long. 79° 46'.

REY-*Grafs*, in *Agriculture*, a hardy early sort of grafs, much esteemed among farmers. See LOLIUM *Perenne*, and RAY-*Grafs*.

REYES, in *Geography*, a town of New Navarre; 64 miles S. of Casa Grande.—Also, a town of Peru, in the Audience of Lima; 12 miles N. of Tarma.

REYES, *Los*, a town of South America, in the province of St. Martha; 140 miles W. of Maracaybo. N. lat. 10° 15'. W. long. 73° 30'.—Also, a small island near the coast of Patagonia, at the entrance of Port Desire. S. lat. 47° 50'.

REYES *Magos*, a town of Brazil; 40 miles N. of Spiritu Santo.

REYES *le Yapey*, *Los*, a town of South America, in the province of Buenos Ayres; 180 miles S.E. of Corrientes.

REYGADA, a town of Portugal, in the province of Beira; six miles N.N.E. of Pinhel.

REYGATE, or REIGATE, a borough and market-town in the west half hundred of Reygate, and county of Surrey, England, is situated at the distance of 19 miles east from Guilford,

REYGATE.

Guilford, and 21 fouth by weft from London. It is of great antiquity, and is mentioned in the General Survey by the appellation Chercefelle, or Chercefield; but it foon afterwards became generally known by that of Ridge-gate, fince corrupted into Reygate. The manor was formerly vefted in the crown; and, previous to the Conqueft, conftituted part of the property fettled by king Edward the Confeflor on his queen, Edith. King William Rufus granted it to the illuftrious family of the Warrens, earls of Warren and Surrey, feveral of whom obtained confiderable privileges for the town. John, earl of Warren, in the reign of Edward II. procured for the inhabitants the charter, under which they now enjoy the right of holding a weekly market on Tuefday. Another, held on the firft Wednefday of every month, was eftablifhed by charter from Charles II.; it was for many years difufed, but has lately been revived.

Reygate is a borough by prefcription only. The government is vefted in a bailiff, conftable, tythingman, ale-tafter, frefh-tafter, fifh-tafter, and leather-feller, with a conftable for the foreign divifion, and a tythingman for each of the forenfic fubdivifions, or tythings. This town originally fent members to parliament in the twenty-third year of Edward I. The electors are the freeholders of meffuages or burgage tenements within the precincts of the borough, and the bailiff is the returning officer.

The parifh of Reygate is divided into two capital precincts, which provide feparately for the maintenance of their refpective poor, *viz.* the borough and the forenfec, or foreign, the latter including all that portion of the parifh not comprehended in the former. Within the precinct of the borough ftands the town itfelf, which is feated at the bafe of a fteep hill of chalk. The buildings are principally difpofed in two long and fpacious ftreets, of which one, called the High-ftreet, runs in a direktion from weft to eaft; and the other, called Bell-ftreet, in a direktion from north to fouth. The parifh church, placed at a fmall diftance from the town, although not diftinguifhed for its antiquity or elegance of its architecture, is neverthelefs one of the beft ecclefiaftical ftructures in the county. It is divided into a nave, two fide aifles, and a chancel, with an embattled tower at the weft end. The nave and chancel are feparated from the aifles by feven pointed arches; five of which, on each fide, are in the nave and two in the chancel; thofe of the former being fupported by pillars, alternately round and octagonal; and thofe of the latter by cluftered pillars of a more elegant form. Every portion of the interior is crowded with monuments and infcriptions to the memory of the Thurlands, of Thurland Caftle in Nottinghamfhire, the Jamefes of Reygate, the Skinners of the fame place, and others of lefs note. In a vault under the chancel, conftituted by William, firft baron Howard of Effingham, are deposited many leaden coffins, containing the remains of the founder, and of feveral of his descendants, earls of Nottingham, and their families. The moft remarkable of thefe is that infcribed to the memory of Charles Howard, earl of Nottingham, who commanded the Britifh fleet in the memorable conteft with the Spanifh armada, A. D. 1588.

The old market-houfe ftood at the weft end of the town, but it having gone to decay, the prefent houfe was erected, by fir Jofeph Jekyll, near the fcite of the ancient priory, which formed one of the terminations of Bell-ftreet. This religious eftablifhment was founded by William de Warren, earl of Surrey, and Ifabel his wife, about the year 1230. The inmates confifted of a prior, and a few canons regular, of the order of St. Auguftine, whofe clear annual revenue, at the time of the diffolution, amounted to 68*l.* 16*s.* 8*d.*

After that event the fcite of the priory, with its appurtenances, was granted by king Henry VIII. to William, lord Howard, in exchange for the reftory of Tottenham in Middlefex. The other religious buildings here were, two chapels, dedicated to St. Lawrence, and to Thomas à Becket, and the hofpital of the Holy Crofs, which feems to have been connected with the priory.

On a confiderable eminence to the north of the town, ftood the ancient caftle of Reygate, the foundation and hiftory of which are little known. Moft of the very fender accounts of it which have reached our times, afcribe its origin to fome of the more ancient earls of Warren and Surrey, but others afert, that the original ftructure was of much earlier date, and the work of our Saxon anceftors. Indeed, if the inhabitants of this part of the country were fo active and fuccefsful in repelling the Danifh invaders, as to give rife to the proverb attributed to them by Camden, "The Vale of Holmeftdale,—never wonne, ne never fhall," it feems not improbable, confidering alfo the importance and advantage of the fituation, that their leaders had a fortrefs here fufficient for the purpofes of rendezvous and fecurity. It is certain that there was a fortrefs at Reygate, of confiderable note, under the earls of Warren, and which feems to have been for many years one, at leaft, of the capital feats of their barony. William, earl of Warren, who poffeffed it in king John's time, is the firft of the family fpoken of by Dugdale as the proprietor of it; and he acknowledges his title to be derived from his earlieft anceftors. This earl, in the conteft between that king and his barons, was one of the neutral lords who joined in the confederacy againft the king with reluctance, and who, at the great council at Runnymede, were inclined to favour him; and by whofe advice the great charter was eventually figned by him. This dubious policy of the earl occafioned the lofs of his caftle at Reygate, which, foon after the landing of Louis the dauphin, was furrendered to him. When it was firft difmantled is uncertain, but it is mentioned as having been decayed and ruinous in the reign of James I. Even then, and for fome time after, it muft have been capable of defence, as in the time of the civil wars, A. D. 1648, the committee of the houfe of commons were ordered "to take care of it, and to put it into fuch a condition, that no ufe might be made to the endangering the peace of the kingdom." What the immediate refult of thefe orders was we are not informed, but it was probably demolished foon afterwards, though a fmall part of the walls was ftanding within the laft forty years. Now, however, every veftige of thefe is gone; but the vallum and ditch are ftill nearly entire on the fouth and weft fides; and in the centre of the area is a defcent, by a flight of fteps, to a paffage 235 feet long, which leads into a cave 123 long, 13 wide, and 11 high. This cave is conjectured to have ferved the double purpofe of a repository for military ftores, and a place of cuftody for prifoners; it might alfo be a place of feafety in times of public commotion.

The park at Reygate is fituated to the fouth of the town. It contains about 150 acres, and appears, by a furvey made in 1622, to have been then well ftored with timber trees, and with venifon. It was difparked within twenty years from that period, and now retains few of its former characteristics, except the name. At Eaft-Beechworth, to the weftward of Reygate, is a feat of the late Hon. William Henry Bouverie, which was built by fir Ralph Freeman in the reign of James I.; and near it is Wontham, a manfion belonging to vifcount Templetown: Gatton, to the northward, about two miles, affords an example of nominal borough representation, fcarcely a houfe being left ftanding within its limits. In this parifh, at a place called Battle,

Battle-bridge, tradition affirms that a great slaughter of the Danes took place. Aubrey states that a castle existed here, but no traces of such a building can now be discovered. See GATTON.

Merstham, to the east of Gatton, is noted for its stone quarries, which were anciently held in such high repute that the crown deemed it expedient to keep them in its own possession. A great part of Windsor castle, and the magnificent chapel of Henry VII. at Westminster, were constructed with stone from these quarries. The quality which renders it peculiarly valuable, is its effectual resistance against fire, whence it is denominated fire-stone. It is very soft when first raised from the quarry, but becomes indurated by exposure to the atmosphere. A rail-road has been formed here to facilitate the conveyance of stone and lime from the quarries to the metropolis. Merstham-place is a spacious mansion belonging to Hylton Jolliffe, esq. In the parish of Newdigate, about six miles south-west from Reygate, is Ewood, a mansion lately erected by the present duke of Norfolk. The house stands on the brow of an eminence, and is surrounded by a park containing about 600 acres of ground, and ornamented with a fine lake, covering sixty acres. At Nutfield, as well as at Reygate, are some fuller's-earth pits, which yield excellent earth. History and Antiquities of the County of Surrey, by the Rev. Owen Manning; edited, with additions, by W. Bray, esq. F.S.A.; vol. i. folio. Beauties of England and Wales, 8vo. vol. xiv. by I. Storbcl.

REYHER, SAMUEL, in *Biography*, an eminent German mathematician, was born at Schleusingen, in Saxony, in the year 1635. He received the early part of his education under his father, and then pursued his mathematical studies at the university of Leipzig. He next went to Leyden, and studied the algebra of Vieta under the celebrated James Golius, with whom he contracted an intimate friendship. On his return to Leipzig, he obtained so high a reputation in teaching the mathematics, that he was nominated preceptor to the young prince of Gotha, the eldest son of the duke of Saxe-Gotha. In 1665 he accepted an invitation to fill the mathematical chair at the university of Kiel, and having first paid a visit to Leyden, he was there admitted to the degree of doctor in civil law. In a few years afterwards he was appointed professor extraordinary of civil law, in 1683 professor in ordinary of the Institutes, and in 1692 professor of the code of Justinian. He died in 1714, in the 80th year of his age. He translated the works of Euclid into the German language, illustrating the geometrical with algebraical demonstrations, wherever they would admit of it; and he published, among many other works, a learned work entitled "Mathesis Biblica;" and a very curious "Dissertation concerning the Inscription on the Cross of Jesus Christ, and the Hour of his Crucifixion." Moreri.

REYN, JAN DE, or RHENI, called also *Lang Jan*, was an artist of very considerable merit, a disciple, and skilful imitator, of Vandyke; to whom he was so much attached that he followed him to London, and remained some time with him. He was born at Dunkirk in 1610; and he so effectually benefited by the instructions of Vandyke, that his pictures are frequently sold for those of that master. But as he, in general, painted history more than portrait, he has a freer line in composition, though not so correct a one as his master. His works are scarce, though he lived to the age of 68, but their apparent scarcity is possibly owing to so many of them being imputed to Vandyke. Among the works which are indisputably his, are mentioned the Baptism of Totila, which is in a church at Dunkirk; and a grand altar-piece in the parish church of St. Martin, at

Bergues, representing Herodias bringing the head of St. John to Herod. He died in 1678.

REYNA, CASSIODORUS DE, celebrated for being the first translator of the whole bible into the Spanish language, and on this account he is noticed, though we have no particulars concerning his life. To his translation he introduced notes explanatory and critical. The place where this version was printed is not mentioned in the title-page, though, from some typographical marks, it may be ascertained pretty correctly that it was at Basil; and as the author was probably a Protestant, he thought proper to conceal his name, that it might not prevent his work from being received among the Spanish Catholics, and it has only his initials R. C. to a Latin preface, recommending it to the kings, princes, and nobles of Europe, and particularly of the Roman empire. The date is 1569, and it is entitled "La Biblia, Que Es, Los Sacros Libros Del Viejo y Nuevo Testamento. Tradladada en Espagnol." The first edition of this version is now very scarce. Moreri.

REYNEAU, CHARLES RENÈ, an eminent French mathematician, was born at Brissac, in the province of Anjou, in the year 1656. At the age of twenty, he took up his residence in the house belonging to the congregation of the Oratory at Paris, without any intention of entering into the community. His object was to enjoy the advantages in study which that celebrated order afforded for improvement in literature. In a short time, however, a change took place in his mind, and he became a member of the house. He became strongly attached to the science of geometry, and in 1683 he was appointed to a mathematical professorship at Angers: this post he retained 22 years with extraordinary reputation. In this situation he undertook to reduce into one body, for the use of his scholars, the principal theories scattered through the writings of Descartes, Leibnitz, Bernouilli, the Leipzig Acts, the Memoirs of the Paris Academy of Sciences, and other works. The fruit of this undertaking, entitled "The Analysis demonstrated, &c." he published at Paris in the year 1708, in two vols. 4to. He assumed this title for his work because it contained demonstrations of several methods of analysis which had not been demonstrated by the authors of them, or, at least, not with sufficient perspicuity and exactness. By supplying what was left undone by other persons, he rendered so signal a service to mathematical students, that it became a maxim, at least in France, that to follow father Reyneau was the best way to make much progress in mathematics. Hence he was esteemed the Euclid of the sublime geometry. His great work was reprinted in 1738. In the year 1714 he drew up an elementary work on the subject, under the title of "The Science of Calculation, &c." which was most favourably received. This came out in one volume, and he had prepared materials for a second, which did not make its appearance till after the author's death. In 1716 the Royal Academy of Sciences at Paris admitted some new members, under the designation of "free associates:" father Reyneau was of that number, and he frequently assisted at their meetings. He died in 1723, at the age of 72, regretted as well for his many virtues, as for profound and extensive learning. The first men in France for talents deemed it an honour to count Reyneau among their friends. In this number was father Malebranche, of whom Reyneau was a zealous disciple. He left behind him a treatise on "Logic, or the Art of Reasoning," which was published in 1745. Moreri.

REYNEL, in *Geography*, a town of France, in the department of the Upper Marne; 12 miles W. of Bourmont.

REYNESBURCH, a town of Holland; three miles N.W. of Leyden.

REYNOLDS,

REYNOLDS.

REYNOLDS, *Sir JOSHUA, Knt.*, in *Biography*, was the son of the Rev. Samuel Reynolds, rector of Plympton, near Plymouth, in Devonshire, and was born there, on July 16, 1723; the tenth of eleven children, five of whom died in their infancy. He was, for some time, instructed in the classics by his father, and was intended for the practice of physic; but he began, at a very early age, to display an inclination for the art in which he subsequently made so distinguished a figure. At eight years of age he made himself so far master of perspective, as to draw his father's bookcase according to rule, and, encouraged by his affectionate parent, amused himself by copying prints that he found in books, and particularly those in Jacob Kat's emblems. From these early labours the transition was easy to the attempt at drawing likenesses of his friends, and in these he obtained tolerable success. Richardson's Treatise on Painting was then put into his hands, and, according to his own report, he was, by that work, stimulated to the greatest degree of enthusiasm for the art of painting, and led to regard its professors, particularly Raphael, as among the greatest and most illustrious of men, either in ancient or modern time. After he had spent some time practising in the neighbouring country, his parents were induced, by the advice of a Mr. Cranch, to send him to London, as the place best calculated to improve talents such as he had so decidedly exhibited; and accordingly, in October 1741, he first visited the capital, and was immediately placed with Mr. Hudson, the most renowned portrait painter of that time, in order to acquire the first rudiments of this art.

Whatever was the cause, whether, as it is said, Hudson became jealous of the ability of his pupil, or, as is equally probable, the pupil became disgusted with the want of taste exhibited by his master, in little more than two years they disagreed, and young Reynolds returned to his father, and again employed himself in painting his friends. Many of these early productions of his pencil are still to be seen in the town and neighbourhood of Plymouth, and some of them possess very considerable merit, and indicate his future prowess. One of them, particularly, of a boy reading in reflected light, 30 years afterwards, excited surprize in his own mind, and an expression of regret that, in so many years, he should have made so little progress in his profession. He is said to have lamented having passed this period of his life in the way he had done; most probably, however, that regret alludes to his absence from London, where he would most undoubtedly have seen more of the art, and learnt more of its practice, than elsewhere. But perhaps it was a fortunate occurrence that he was removed to a station where he had to rely upon his own emotions, unbiassed by the gross and barbarous taste which then prevailed; since, guided by those emotions, he attempted to follow the dictates of nature, untrammelled by the pedantry of amateurs, and the low ignorance of the greater part of the professors of the day.

Finding his practice increasing, he took a house at Plymouth Dock, and there became known to the family of Mount Edgumbe, by whom he was warmly patronized, and recommended to captain (afterwards lord) Keppel, who carried him to Italy in 1749; and it would appear, from a letter of his to lord Mount Edgumbe, written when he was in Rome, that that noble lord defrayed the expence of his residence there. The course of his studies during the three years that he spent there, is not precisely known. He made some few copies of figures and heads from the works of Raphael, but that does not appear to have been a favourite mode of study with him, for in one of his lectures he has said, "the man of true genius, instead of spending

all his hours, as many artists do while they are at Rome, in measuring statues, and copying pictures, soon begins to think for himself, and endeavours to do something like what he sees. I consider general copying as a delusive kind of industry; the student satisfies himself with the appearance of doing something; he falls into the danger of imitating without selecting, and of labouring without any determinate object: as it requires no effort of the mind, he sleeps over his work; and those powers of invention and disposition, which ought particularly to be called out and put in action, lie torpid, and lose their energy for want of exercise. How incapable of producing any thing of their own, those are, who have spent most of their time in copying, is an observation well known to all who are conversant in our art." That he reflected deeply on the great works of the ancient and modern masters is evident, both from his pictures and writings; though the taste with which he subsequently applied the knowledge he had acquired, proves the originality of his mind, and the extent of his genius.

Mr. Reynolds returned through Paris to England in October 1752, and after a short time spent at his native place, to recruit his health, which had somewhat suffered by the journey, he fixed his settled residence in the metropolis; taking a house in St. Martin's-lane. He there painted, as his first essay, a head, from an Italian youth he had brought over with him, (Giuseppe Marchi). He dressed it in a rich turban, and its execution excited so much attention, that his old master, Hudson, was induced to go to see it, and carefully watched its progress: when, upon seeing at length no trace of his own manner left, and unable, or unwilling, to find any other merit in it, he exclaimed, "why Reynolds, you don't paint so well as you did when you left England!" Notwithstanding this augural declaration, the pupil became the superior favourite with the public; and Hudson retiring, left him without a competitor.

In 1753, or 4, he took a large house in Newport-street, where he resided for eight or nine years, and there he painted a whole length portrait of his friend commodore Keppel walking on the sea-shore, which drew upon him universal admiration, and fixed him completely in the public esteem. At this time his price was ten guineas for a head; in 1755 he raised it to twelve; and in 1758 to twenty guineas; and he afterwards, by degrees, advanced it to fifty; at which it remained till he declined practice; the price of a half length, during the latter period, being 100, and for a whole length 200 guineas.

To say that he was universally regarded as being at the head of the profession of portrait painting at the time adverted to, cannot indeed be considered as any great praise, such was its degraded condition; though Hudson had certainly advanced above his immediate predecessors. Reynolds however, deserved much more, for he united to a dignified characteristic resemblance of the head, an endless variety of spirited and graceful attitudes, picturesque back-grounds, novel and striking effects of light and shade, with a voluptuous richness and harmony of colour, which certainly had never before been seen united to so many other qualities in that branch of the art. It must not, however, be understood, that his performances at that time possessed those excellencies to the degree in which we find them in his latter works; for he was one of the few, whose efforts ended but with his life; who has been heard to say, that he never began a picture without a determination to make it his best; and whose unceasing progress almost justified the maxim he was so fond of repeating continually, "that nothing is denied to well directed industry." Besides his uncommon

assiduity, which was apparent to all, little information remains to us of the precise method of study by which such extraordinary excellence was attained, except what may be collected from the following extract, made from some papers left by him, and intended perhaps for insertion in another discourse; in which, as his biographer observes, he speaks of his merits and defects with singular modesty and candour. "Not having the advantage of an early academical education, I never had that facility of drawing the naked figure which an artist ought to have. It appeared to me too late when I went to Italy, and began to feel my deficiencies, to endeavour to acquire that readiness of invention which I observed others to possess. I consoled myself, however, by remarking, that those ready inventors are extremely apt to acquiesce in imperfection, and that if I had not their facility, I should, for this very reason, be more likely to avoid the defect which too often accompanied it,—a trite and common-place invention. How difficult it is for the artist who possesses this facility to guard against carelessness and common-place, is well known; and in a kindred art, Metastasio is an eminent instance, who always complained of the great difficulty he found in obtaining correctness, in consequence of his having been in his youth an *improvvisatore*. Having this defect constantly in my mind, I never was contented with common-place attitudes or inventions of any kind. I considered myself as playing a great game; and instead of saving money, I laid it out faster than I got it, in purchasing the best examples of the art that could be procured; for I even borrowed money for this purpose. The possessing portraits by Titian, Vandyke, Rembrandt, &c. I considered as the best kind of wealth. By studying carefully the works of great masters, this advantage is obtained: we find that certain niceties of expression are capable of being executed, which otherwise we might suppose beyond the reach of art. This gives us a confidence in ourselves, and we are thus incited to endeavour at not only the same happiness of execution, but also at other congenial excellencies. Study, indeed, consists in learning to see nature, and may be called the art of using other men's minds. By this kind of contemplation and exercise, we are taught to think in their way, and sometimes to attain their excellence. Thus, for instance, if I had never seen any of the works of Correggio, I should never, perhaps, have remarked in nature the expression which I find in one of his pieces: or if I had remarked it, I might have thought it too difficult, or perhaps impossible, to be executed.

"My success and continual improvement in my art (if I may be allowed that expression), may be ascribed, in good measure, to a principle which I will boldly recommend to imitation; I mean a principle of honesty, which in this, as in all other instances, is, according to the vulgar proverb, certainly the best policy. I always endeavoured to do my best. Great or vulgar, good subjects or bad, all had nature; by the exact representation of which, or even by the endeavour to give such a representation, the painter cannot but improve in his art.

"My principal labour was employed on the whole together, and I was never weary of changing and trying different modes and effects. I had always some scheme in my mind, and a perpetual desire to advance. By constantly endeavouring to do my best, I acquired a power of doing that with spontaneous felicity, which at first was the effort of my whole mind, and my reward was three-fold; the satisfaction resulting from acting upon this just principle, improvement in my art, and the pleasure derived from a constant pursuit after excellence.

"I was always willing to believe that my uncertainty of proceeding in my works, that is, my never being sure of my hand, and my frequent alterations, arose from a refined taste, which could not acquiesce in any thing short of a high degree of excellence. I had not an opportunity of being early initiated in the principles of colouring; no man, indeed, could teach me. If I have never been settled with respect to colouring, let it at the same time be remembered, that my unsteadiness in this respect proceeded from an inordinate desire to possess every kind of excellence that I saw in the works of others: without considering that there are in colouring, as in style, excellencies which are incompatible with each other: however, this pursuit, or any similar one, prevents the artist from being tired of his art. We all know how often those masters who sought after colouring changed their manner, while others, merely from not seeing various modes, acquiesced all their lives in that in which they set out. On the contrary, I tried every effect of colour; and by leaving out every colour in its turn, shewed every colour that I could do without it. As I alternately left out every colour, I tried every new one; and often, as is well known, failed. The former practice, I am aware, may be compared by those whose first object is ridicule, to that of the poet mentioned in the Spectator, who in a poem of 24 books, contrived in each book to leave out a letter. But I was influenced by no such idle or foolish affectation; my fickleness in the mode of colouring, arose from an eager desire to attain the highest excellence. This is the only merit I can assume to myself from my conduct in this respect."

His assiduity and love of his profession left him little leisure for country excursions. Occasionally, however, he spent a few days at his villa on Richmond-hill, and visited, at different times, the seats of some of the noblemen and gentlemen of his acquaintance, from whence he was always glad to return to the practice of his profession, and the enjoyment of that intellectual society, of which, like his friend Johnson, he justly considered London as the headquarters. He, very soon after he became settled, perceived the advantage which one confined to the laborious duties of an arduous profession might derive from the society of literary men. Finding how little time he could spare from his profession, for the purpose of acquiring general knowledge from books, he resolved to partake as much as possible of the benefits which might be drawn from the conversation of the learned and ingenious men of his time. In consequence of this, and of his cheerful and convivial habits, his table, for above thirty years, exhibited an assemblage of all the talents of Great Britain and Ireland; there being, during that period, scarcely a person in the three kingdoms distinguished for his attainments in literature or the arts, or for his exertions at the bar, in the senate, or the field, who was not occasionally found there.

Soon after the return of sir Joshua from Italy, he became acquainted with Dr. Johnson, to whose superior talents he was always proud to acknowledge his obligations; and in the paper we have before-mentioned, had expressed his sense of the benefit he had derived from his society. When speaking of the value of associating either personally or by study with the truly great, he adds, "May I presume to introduce myself as an instance of the truth of what I have remarked. Whatever merit the discourses which I have had the honour of delivering from this place may have, it may in great measure be imputed to the education which I may be said to have had under Dr. Johnson. I do not mean to say, though it certainly would be to the credit of these discourses, if I could say it with truth, that he

contributed even a single sentiment to them; but he qualified my mind to think justly. No man had, like him, the faculty of teaching inferior minds the art of thinking."—"The observations which he made on poetry, on life, and on every thing about us, I applied to one art; with what success others must judge." The great leviathan of literature found in the mind of Reynolds a congenial purity and strength, and became zealously attached to him; who, with such a coadjutor, found but little difficulty in collecting around him a circle of the most able and useful members of society. Many illustrious foreigners were personally intimate with him; and his friendship was sought by individuals of the highest quality; who revered his genius as much as they respected the worth of his private character. From such connections, his mind, rich in its own stores, received an accession of most extensive information, and an inexhaustible treasure for conversation. He had a mind ever open to acquire useful knowledge; a sound and penetrating judgment to select what he acquired, and great industry and application in rendering his acquirements useful.

The variety of talent he exhibited, and the consequent eminence which he gained, qualified him to share the honours of the first scientific institutions. He was accordingly admitted to the Royal, the Antiquarian, and the Dilletanti Societies; and when the late lord North was installed chancellor of the university of Oxford, in July 1773, sir Joshua was admitted to the honorary degree of doctor in civil law. He had previously, in 1769, been elected to the presidency of the Royal Academy, in the formation of which he had a principal share, and had, upon the occasion, been honoured by his majesty with the rank of knighthood. To this institution he was a most invaluable member, and repaid the honour and fame he acquired from his situation in it, by a zealous attention to its interests. Nor did the Academy derive less credit from the admirable works which he continued yearly to exhibit in it, consisting indeed chiefly of portraits, though he rarely suffered a season to pass in which he did not bring forwards one or more specimens of his powers in history. From the year 1769, when, as we have said, the academy was founded, till 1790, inclusive, it appears that he sent no less than 244 pictures to the exhibition.

The task of reading lectures was no part of the prescribed duty of his office: but imposed voluntarily upon himself for the following reasons, assigned by him in his fifteenth discourse. "If prizes were to be given, it appeared not only proper, but almost indispensably necessary, that something should be said by the president on the delivery of those prizes; and the president, for his own credit, would wish to say something more than mere words of compliment: which, by being frequently repeated, would soon become flat and uninteresting; and by being uttered to many, would at last become a distinction to none. I thought, therefore, if I were to preface this compliment with some instructive observations on the art, when we crowned merit in the artists whom we rewarded, I might do something to animate and guide them in their future attempts." To the exertions which this most judicious sense of propriety stimulated him to make, he is indebted, principally, for his renown as an author. In the course of twenty-one years, *viz.* from 1769 to 1790, inclusive, he composed fifteen discourses; replete with the soundest principles, and the most useful information concerning the art he practised, that ever have been given to the world. In which, though it must be acknowledged that there are some few points not sufficiently explained, yet they are free from the affected rant of connoisseurship, and practically efficient to guide the young, whilst it confirms the more ad-

vanced, in pursuit of the just objects of the art of painting, and the surest means of obtaining success. Besides these, he wrote three papers for the *Idler*, in 1759; *viz.* Nos. 76, 79, and 82; in which is exhibited his original turn of thinking on the nature and properties of beauty and of art: and in 1783, his notes to Malon's translation of Du Fresnoy's poem on Painting, gave to the world many practical observations and explanations of the rules laid down in the text, which convey instruction of the most useful kind, and tend to shew how carefully, and how systematically, his mind was made up on the subject.

It has been conjectured, and widely diffused in opinion, that sir Joshua did not compose his lectures himself. In support of what is due to him on that head, Mr. Northcote, who lived some years in his house, has said in his memoirs, "At the period when it was expected he should have composed them, I have heard him walking at intervals in his room till one or two o'clock in the morning, and I have on the following day, at an early hour, seen the papers on the subject of his art which had been written the preceding night. I have had the rude manuscript from himself, in his own handwriting, in order to make a fair copy from it for him to read in public: I have seen the manuscript also after it had been revised by Dr. Johnson, who has sometimes altered it to a wrong meaning, from his total ignorance of the subject and of art; but never, to my knowledge, saw the marks of Burke's pen in any of the manuscripts.

"The bishop of Rochester, also, who examined the writings of Mr. Burke since his death, and lately edited a part of them, informed a friend that he could discover no reason to think that Mr. Burke had the least hand in the discourses of Reynolds." And Burke himself, in a letter to Mr. Malone, after the publication of sir Joshua's life and works, says, "I have read over some part of the discourses with an unusual sort of pleasure, partly because being faded a little in my memory, they have a sort of appearance of novelty; partly by reviving recollections mixed with melancholy and satisfaction. The Flemish journal I had never seen before. You trace in that, every where, the spirit of the discourses, supported by new examples. He is always the same man; the same philosophical, the same artist-like critic, the same sagacious observer, with the same minuteness, without the smallest degree of trifling." We may safely say, this is not the language of one who had himself contributed much to those discourses. And if neither Johnson nor Burke wrote for Reynolds, to whom else among his contemporaries shall the praise due to those invaluable compositions be given, if Reynolds is to be deprived of it!

It is much to be lamented, that the world was deprived of this great artist before he had put into execution a plan which his biographer, Mr. Malone, says appears, from some loose papers, to have been revolved in his mind. "I have found," says that author, "among sir Joshua's papers, some detached and unconnected thoughts, written occasionally, as hints for a discourse, on a new and singular plan, which he seems to have intended as a history of his mind, so far as concerned his art; and of his progress, studies, and practice; together with a view of the advantages he had enjoyed, and the disadvantages he had laboured under, in the course that he had run: a scheme, from which, however liable it might be to the ridicule of wits and scoffers, (of which, he says, he was perfectly aware,) he conceived the students might derive some useful documents for the regulation of their own conduct and practice." Such a composition, from such a man, written after he had spent a long life in successful practice, with none to guide him; who had chosen a line of art for himself, stamped with originality; and in which he had to develope

develope principles, and elucidate them by practice; and competent as he was to explain the operations of his own mind; could not fail of being interesting and useful in the highest degree. One of these detached ideas we have quoted above, and lament that any of them should be withheld from publication.

In 1781, during the summer, he made a tour through Holland and the Netherlands, with a view of examining critically the works of the celebrated masters of the Dutch and Flemish schools. An account of this journey, written by himself, containing much excellent criticism on the works of Rubens, Vandyke, Rembrandt, &c. in the churches and different collections at Antwerp, Bruffels, Ghent, the Dusseldorf gallery, and at Amsterdam, was published after his death; it concludes with a mally drawn character of Rubens.

In 1783, in consequence of the emperor's suppression of some religious houses, he again visited Flanders, purchased some pictures by Rubens, and devoted several more days to the contemplation and further investigation of the performances of that great man. On his return, he remarked that his own pictures wanted force and brilliancy, and appeared, by his subsequent practice, to have benefited by the observations he had made. This year, on the death of Ramsay, he was made principal painter in ordinary to his majesty, and continued so till his death.

For a very long period he had enjoyed an almost uninterrupted state of good health, except that in the year 1782 he was for a short time afflicted with a paralytic stroke. A few weeks, however, perfectly restored him, and he suffered no inconvenience from it afterwards. But in July 1789, whilst he was painting the portrait of lady Beauchamp, he found his sight so much affected, that it was with difficulty he could proceed with his work; and notwithstanding every assistance that could be procured, he was in a few months totally deprived of the use of his left eye. After some struggles, he determined, lest his remaining eye should also suffer, to paint no more: and though he was thus deprived of a constant employment and amusement, he retained his usual spirits, and partook of the society of his friends with apparently the same pleasure to which he had been accustomed; and was amused by reading, or hearing others read to him. In October 1791, however, his spirits began to fail him, and he became dejected, from an apprehension that an inflamed tumour, which took place over the eye that had perished, might occasion the destruction of the other also. Meanwhile he laboured under a more dangerous disease, which deprived him both of his spirits and his appetite. During this period of great affliction to all his friends, his malady was by many supposed to be imaginary, and it was erroneously conceived, that by exertion he might shake it off; for he was wholly unable to explain to the physicians the nature or seat of his disorder. It was only about a fortnight before his death that it was found to be in the liver; the inordinate growth of which, as it afterwards appeared, had incommoded all the functions of life. Of this disease, which he bore with great fortitude and patience, he died, after a confinement of three months, at his house in Leicester-square, on Thursday evening, February 23, 1792, at the age of 69.

In stature, sir Joshua Reynolds was rather under the middle size, of a florid complexion, roundish, blunt features, and a lively pleasing aspect; not corpulent, though somewhat inclined to it; and extremely active. With manners uncommonly polished and agreeable, he possessed a constant flow of spirits, which rendered him at all times a most desirable companion: always ready to be amused, and to contribute to the amusement of others, and anxious to receive

information on every subject that presented itself: and though he had been deaf almost from the time of his return from Italy; yet, by the aid of an ear trumpet, he was enabled to partake of the conversation of his friends with great facility and convenience. On the 3d of March his remains were interred in the crypt of St. Paul's, near the tomb of sir Christopher Wren, with every honour that could be shewn to worth and genius by an enlightened nation; a great number of the most distinguished persons attending the funeral ceremony, and his pall being supported by three dukes, two marquises, and five other noblemen.

In many respects, both as a man and a painter, sir Joshua Reynolds cannot be too much studied, praised, and imitated by every one who wishes to attain the like eminence. His incessant industry was never wearied into despondency by miscarriage, nor elated into neglect by success. Either in his painting-room, or wherever else he passed his time, his mind was devoted to the charms of his profession. All nature, and all art, was his academy, and his reflection was ever on the wing, comprehensive, vigorous, discriminating, and retentive. With taste to perceive all the varieties of the picturesque, judgment to select, and skill to combine what would serve his purpose, few have ever been empowered by nature to do more from the fund of his own genius: and none ever endeavoured more to take advantage of the labours of others. He made a splendid and useful collection, in which no expence was spared. His house was filled, to the remotest corners, with casts from the antique statues, pictures, drawings, and prints, by various masters of all the different schools. Those he looked upon as his library, at once objects of amusement, of study, and competition. After his death they were sold by auction, with his unclaimed and unfinished works, and, together, produced the sum of 16,947*l.* 7*s.* 6*d.* The substance of his whole property, accumulated entirely by his pencil, and left behind after a life in which he freely parted with his wealth, amounted to about 80,000*l.*

It remains to speak of his style as an artist, which is precisely that, denominated in his lectures the ornamental style; but which, beautiful and seducing as it undoubtedly is, cannot be recommended in so unreserved a degree as his industry both in study and practice: that which he characteristically terms his own uncertainty, both in design and in execution, operates too frequently and too powerfully against its entire adoption. In the higher attainments of the art, colouring and chiaro-scuro were undoubtedly elements which he favoured, and in which he moved uncontrolled. Drawing, as he himself candidly confessed, was the part of the art in which he was most defective; and from a desire perhaps to hide this defect, with an over-solicitude to produce a superabundant richness of effect, he was sometimes tempted to fritter his lights, and break up his composition, particularly if it happened to be large, into too many parts: yet, in general, his taste in lines and forms was at the same time grand and graceful; and the taste and skill with which he drew and set together the features of the human face, has never been surpassed by any artist. We would be understood to speak of his finest productions; of the ordinary class among them, we must allow, that the marking favours of manner, and the substance is not always characteristic of flesh.

In execution, though he wanted the firmness and breadth which appertain to the highest style of art, yet the spirit and sweetness of his touch were admirable, and would have been more remarkable, had he been more a master of drawing: but not being able readily to determine his forms, he was obliged to go over and over the same part, till some of the vivacity of his handling was frequently lost; his labour,

bour, however, was never wholly so, for he added to the force and harmony of his pictures by these repetitions; and frequently attained graces by them which would otherwise perhaps have remained unknown.

The numberless instances in which he is known to have borrowed thoughts, both in actions of figures, and effect of colour, seem to impeach his power of invention. But surely it could not proceed from want of a sufficient portion of that high and necessary quality, that he, who produced so many novel combinations, adopted that short-hand path to composition. We see it exemplified in a superior degree in most of his principal productions; and particularly in his whole length and half length portraits; the arrangements of which are no less beautiful and interesting, than new, and entirely his own. These are composed in a taste far surpassing all that had ever been done by his predecessors; uniting the grandeur, simplicity, and fulness of Titian, and the grace and nature of Vandyke, with the artful and attractive effects of Rembrandt.

Most probably he adopted that line of conduct from necessity; driven to it by the immense source of employment which his talents for portraiture showered upon him. He had scarcely time to invent new actions or effects in all cases, or to bestow that study upon them which would have been requisite, and therefore he satisfied himself by endeavouring to infuse into those he borrowed more elegance, more feeling, or more sentiment. How effectually he did this, needs not here be mentioned. One quality he had, which no other painter that ever breathed shares with him in an equal degree, fascination. The effect of his best pictures acts like a charm, and arrests the tasteful beholder with irresistible power. On the works of others we look with approbation, and sometimes with feelings of admiration and delight, or even with a sensation of awe; but in those of Reynolds there is generally an indescribable unity and amenity, which act upon us with most fascinating power, and rivet the attention with superior gratification. No real connoisseur can deny the existence of this quality in his pictures, but wherein it specifically dwells, it is not easy to discover or define. They are not laboured to perfect imitation, indeed they stop very far short of that; yet they present a full image, with a degree of life and animation, that has rarely been displayed upon canvas. It is a dangerous doctrine to advance, and may be abused; but, perhaps, this power may be in great measure owing to his having painted less upon system, than from feeling; and the latter governing the exercise of his pencil, not to the neglect of, but in a superior degree to the influence of the former, necessarily imbued his works with a glow of nature; which, it will be allowed, attracts beyond the power of art. Whencesoever this fascination, of which we speak, proceeds, it must be acknowledged, that no painter ever possessed it like Reynolds.

His historical works are but few. Those, however, exhibit a power, of which it is fair to say, that if it had been early cultivated, and kept in employment, he would most probably have rivalled the great names of antiquity. His poetic and fancy subjects are treated with originality, variety, taste, and sentiment.

The sense of his extraordinary talents was revived and strengthened to its proper medium, by a most just and pleasing tribute paid to his memory in the course of the year 1813: viz. a public exhibition of a selection of his works at the gallery of the British Institution, Pall Mall. About 150 pictures, productions of his easel, collected from various possessors, were arranged for the inspection of the public; and presented an assemblage of taste and

genius, such as we conceive no other country in the world could boast. At least in an equal number of any other artist's productions, so pleasing a combination of the beauties of the art of painting could no where be found: and these were but a small proportion, indeed, of the number of pictures which he painted. There are engravings from upwards of 700 of his works, and a vast number of others have evidently never been under the engraver's hands. The idea of this token of respect to our great artist originated in conversation at the annual dinner of the Royal Academy, in 1812; when, upon its being proposed to his royal highness the prince of Wales, who was present, he entered most cordially into it, and professed his readiness to lend his own pictures for the purpose. The exhibition being prepared, it was opened on Saturday, the 11th of May, when the members of the institution gave a grand dinner to a large portion of the nobility and the members of the Royal Academy, which was honoured by the presence of the prince regent. After the dinner the rooms were illuminated by lamps, and the company increased and adorned by the admission of ladies, many of whom had been the happy subjects of his ingenious pencil: for he is said to have preferred to posterity the features of three generations of the beauty and fashion of the country.

The pleasure afforded to the country at large by this exhibition was testified by the immense concourse of people that flocked to behold and admire, during the whole time of its remaining open. So that the funds of this excellent institution were well replenished, its object of exalting the honour of the artist and his profession most amply effected, and the country itself exalted in the estimation of the world, by this effective display of native power in an art, the neglect of which had been the source of obloquy upon our climate, as it continues, notwithstanding and more justly, still to be upon our government.

We shall conclude our account of this great and valuable man, by quoting part of an eulogium written by his friend Mr. E. Burke a few hours after the melancholy event, which it commemorates, had taken place. "He possessed," said that clear investigator of character, "the theory, as perfectly as the practice, of his art. To be such a painter, he was a profound and penetrating philosopher.

"In full affluence of foreign and domestic fame, admired by the expert in art, and by the learned in science, courted by the great, caressed by sovereign powers, and celebrated by distinguished poets, his native humility, modesty, and candour, never forsook him, even on surprize or provocation; nor was the least degree of arrogance or assumption visible to the most scrutinizing eye, in any part of his conduct or discourse.

"His talents of every kind, powerful from nature, and not meanly cultivated by letters, his social virtues in all the relations and all the habitudes of life, rendered him the centre of a very great and unparalleled variety of agreeable societies, which will be dissipated by his death. He had too much merit, not to excite some jealousy; too much innocence, to provoke any enmity. The loss of no man of his time can be felt with more sincere, general, and unmixed sorrow.

"Hail! and Farewell!"

REYNOLDS' *Island*, in *Geography*, a small island in the Florida Stream. N. lat. 24°. W. long. 81° 30'.

REYNOSA, a town of Spain, in Old Castile; 35 miles N.W. of Frias.

REYOOR, a town of Hindoostan, in the circar of Condapilly; 15 miles S.E. of Condapilly.

REZ, a river of Russia, which runs into the Irbit. N. lat. 57° 50'. E. long. 62° 34'.

REZEMICO, a town of Italy, in the department of the Lario; 20 miles N. of Como.

REZITZA, a town of Russia, in the government of Polotsk; 72 miles N.N.W. of Polotsk. N. lat. 56° 25'. E. long. 27° 4'.

REZZATO, a town of Italy, in the department of the Mela; 4 miles E. of Brescia.

REZZLE, a term provincially signifying the weezle.

RHA, in *Botany*, $\rho\alpha$, or $\rho\alpha$, of Dioscorides, "which fume," says he, "call $\rho\alpha$," is described by that ancient writer as the produce of the countries above the Bosphorus, from whence it was brought to Greece. "The root is black externally, like the Greater Centaury, but smaller, and internally of a more reddish hue, destitute of odour, loose, fungous, and rather light." He proceeds to describe its flavour and virtues. The plant of Dioscorides has generally been supposed one of the rhubarbs of the shops, which acquired, subsequently to his time, the name of *Rha-barbarum*, because it was procured from countries deemed barbarous by the Greeks and Romans. What precise species of RHEUM (see that article) it might be, we presume not to determine. Sometimes it has been termed *Rhaponticum*; though the latter appellation has also been bestowed on a species of *Centaurea*, which Dodonæus and others have thought to be the true ancient *Rha*, or *Rheum*, and which Linnæus, therefore, names *Centaurea Rhapontica*.

RHAAD, in *Ornithology*, a species of *Otis*; which see.

RHABBARUM, in *Botany*. See RHA.

RHABDOIDES, $\rho\alpha\delta\omicron\iota\delta\epsilon\iota\varsigma$, formed from $\rho\alpha\delta\omicron\iota$, *rod*, or *staff*, and $\epsilon\iota\delta\omicron\iota\varsigma$, *form*, in *Anatomy*, a name given the second true future of the skull, called also the *sagittal future*.

RHABDOLOGY, or RABDOLOGY, in *Arithmetic*, a name sometimes given to the method of performing the two most difficult and operose rules, *viz.* multiplication and division, by the two easiest, *viz.* addition and subtraction, by means of two little rods or laminæ, on which are inscribed the simple numbers, and which are to be shifted according to certain rules.

These rods are what we popularly call *Nieper's bones*, from their inventor, a Scottish baron, who likewise invented logarithms. For their description and use, see *NIEPER'S BONES*.

RHABDOMANCY, an ancient method of divination, performed by means of rods or staves.

Whence its name, from the Greek $\rho\alpha\delta\omicron\iota$, *rod*, and $\mu\alpha\upsilon\tau\alpha\iota\varsigma$, *divination*.

St. Jerom makes mention of this kind of divination, in his commentary on Hosea, ch. iv. 12. The same he finds again in Ezekiel, xxi. 21, 22.

If it be the same kind of divination that is mentioned in the two passages, rhabdromancy must have been also the same superstition with belomancy.

In effect, the two are ordinarily confounded. The Seventy themselves translate the $\rho\alpha\delta\omicron\iota$ of Ezekiel, by $\rho\alpha\delta\omicron\iota$, *a rod*; though in strictness it signifies an *arrow*.

This however is certain; the instruments of divination mentioned by Hosea are different from those of Ezekiel.

In the former it is $\epsilon\iota\varsigma$, *etso*, $\mu\alpha\kappa\lambda\omicron$, *his wood*, his *staff*; in the latter, $\rho\alpha\delta\omicron\iota$, *hhisim*, *arrows*. Though it is possible they might use rods or arrows indifferently; or the military men might use arrows, and the rest rods. It appears by the laws of the Frisones, that the ancient inhabitants of Germany practised rhabdromancy. The Scy-

thians were likewise acquainted with the use of it; and Herodotus observes (lib. iv.) that the women among the Alani fought and gathered together fine straight rods or wands, and used them in the like superstition.

RHABDONALEPSIS, $\rho\alpha\delta\omicron\iota\omicron\nu\alpha\lambda\epsilon\psi\iota\varsigma$, among the Greeks, the Reception or Elevation of the Rod, a festival kept every year in the island of Cos, at which the priests carried a cypress-tree.

RHABDOPHORI, $\rho\alpha\delta\omicron\iota\phi\omicron\upsilon\omicron\iota$, among the Greeks, officers appointed to preserve peace and good order, and to correct the unruly at their public games.

RHABDUS, $\rho\alpha\delta\omicron\iota$, among the *Ancients*, the iron rod with which the boys rolled the trochus.

RHACHITIS, in *Surgery*. See RACHITIS and RICKETS.

RHACOMA, in *Botany*, a name adopted by Linnæus from Piiny, and applied to the genus called by Browne *Crossopetalum*, but which proves not distinct from MYGINDA; see that article. The real *Rhacoma* of Pliny appears, by his copious account of its characters and qualities, to be some kind of rhubarb (see RHA and RHEUM); nor do we pretend to account for the Linnæan application of the name.

RHACOSIS, from $\rho\alpha\chi\omicron\iota$, *a rag*, in *Surgery*, a ragged, excoriated, and relaxed state of the scrotum.

RHADAMANTHUS, in *Mythology*, one of the three judges or sovereigns of Hades, or the invisible world, to whom was assigned Tartarus, as Erebus was to Minos, and Elysium to Æacus. He was the brother of Minos, and the son of Jupiter and Europa; and is said to have been preferred to the honour of presiding over Tartarus, on account of the distinguished wisdom and justice of his administration.

According to Plato, Æacus judged the Europeans; and Rhadamanthus, who had left Crete, and fixed his residence in Asia, had the Asiatics for his lot, among whom were also comprehended the Africans. The stern Rhadamanthus superintends in Tartarus the execution of the sentences which his brother Minos pronounces, after shaking the fatal urn in which are contained the destinies of all mortals. The office of Rhadamanthus is described by Virgil, *Æneid*, lib. iv.

"Gnosius hæc Rhadamanthus habet durissima regna
Castigatque auditque dolos, subigitque fateri,
Quæ quisque apud superos, furto lætatus inani
Distulit in seram commissa piacula mortem."

RHADAMISTUS, in *Entomology*, a species of *Scarabeus*; which see. It inhabits Tranquebar.

RHADEN, in *Geography*, a town of Westphalia, in the principality of Minden; 15 miles N.W. of Minden.

RHADES, a town of Africa, in the kingdom of Tunis, anciently called "Ades;" six miles S.E. of Tunis.

RHÆTEUM, or RHETEUM, in *Ancient Geography*, a promontory in the vicinity of Troy, on which was erected a tomb to Ajax, mentioned by Strabo (l. 13.) and other ancient writers. Horace indeed says (Sat. l. 2.) that this hero remained without burial; but he deviates from the truth, in allusion to that incident in the tragedy of Ajax, where Sophocles feigns that Agamemnon was unwilling to allow the honours of burial to be conferred upon him, but that he yielded at length to the importunate intreaties of Teucer.

RHÆTIA, a country of Europe, which occupied part of the Alps, and was situated to the north of Italy, and to the east of Helvetia. It is not easy to ascertain its limits to the north, but we may say that it was bounded in that quarter by Vindelicia; and, in general, that it corresponded to the country

country of the Grifons, and to the cantons of Uri, Glaris, &c. as far as the "Brigantinus lacus," or lake of Constance: it extended also over the Tyrol. This country was called Western Illyricum, and was divided into Rhætia Prima or Propria, and Secunda, extending towards Swabia, Bavaria, and Austria. This district was subjected to the Romans by Drusus, under the reign of Augustus. Soon afterwards Vindelicia took up arms in their favour, and Tiberius was sent against them, and reduced their country, so that the possessions of the Romans extended as far as the Danube. The whole of this extensive territory had borne the name of Rhætia; but under Dioclesian it was divided, as we have said, into Rhætia Prima and Secunda, the latter of which divisions was Vindelicia. Rhætia, Noricum, and some other territories, became a Roman province, and belonged to the kingdom of the Ostrogoths in Italy; but upon the declension of it, they fell under the dominion of the Franks, about which time the name of Bavarians first became celebrated in history. The principal rivers of Rhætia were the Rhenus or Rhine, the Athesis or Adige, the Oenus or Inn, the Ticinus or Tostin, and Addua. The most considerable places were Curia or Coira, at a small distance east of the Rhenus, and Tridentum or Trent, on the Athesis. Ptolemy, in his geography of Rhætia, reckons upon the Danube the following towns, viz. Bragodurum, Dracuina, Viana, and Phæniana; and towards the source of the Rhine, Tagahum, Brigantium, Ebodunum, Drusomagus, and Ectodurum.

RHAGADES, *ῥαγάδες*, in *Surgery*, a Greek term used for the chaps or clefts in the lips, hands, anus, and other soft parts of the body.

Rhagades are a sort of fissures, and little chapped ulcers of the œdematous kind; formed of a sharp saline humour, and occasioning a great contraction and straightening of the part, which is by this means shrivelled up like a wet parchment, when held to the fire.

They are chiefly found on the fundament, the neck of the womb, the præputium, lips, &c. sometimes even in the mouth; in which case the patient is not able to speak, chew, or the like.

They are sometimes moist, and of a cancerous nature, eating deep, and difficult of cure; but they are more commonly of a less malignant tendency, being often in the anus the consequence of a diarrhœa, dysentery, or the like.

RHAGADIOLUS, in *Botany*, see **LAPSANA**; under the fourth species of which its etymology is given.

RHAGAURA, in *Ancient Geography*, a town of Asia, in Aria, between Siphara and Zamuchana. Ptolemy.

RHAGE, a word used by medical writers for a fissure or chap in any part. The stones of grapes are also by some called *rhages*; and by others the same word is made to express the extremities of the fingers or toes.

RHAGEA, in *Ancient Geography*, a town of Asia, in Parthia, near Appha, according to Ptolemy.

RHAGES, a town of Macedonia, on the banks of the river Peneus, about ten miles from Larissa, according to Livy.

RHAGIA, a town of Asia, in Babylonia, towards Arabia Felix, between Jamba and Chiriphe, according to Ptolemy.

RHAGIANA, a town of Gedrosia, near the "Portus Mulierum;" so called in the translation of Ptolemy; but in the text of Ptolemy it is called "Rapava."

RHAGODIA, in *Botany*, from *ραξ*, a berry, because its little pulpy fruit affords a principal mark of distinction between this genus and several others, to which it is nearly related.—Brown Prodr. Nov. Holl. v. 1. 408. Ait. Hort.

Kew. v. 5. 440.—Class and order, *Polygamia Monoœsia*; Brown; but we should rather say *Pentandria Digynia*, though some of the flowers are defective as to the stamens or the pistil. Nat. Ord. *Holeracea*, Linn. *Atriplices*, Juss. *Chenopodeæ*, Decandolle and Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, concave, permanent, in five deep ovate segments. *Cor.* none. *Stam.* Filaments five, awl-shaped, opposite to the segments of the calyx, and about as long; anthers roundish, two-lobed. *Pist.* Germen orbicular, depressed; styles two, divaricated, short; stigmas simple. *Peric.* Berry orbicular, depressed, encompassed underneath by the calyx. *Seed* solitary, the shape of the berry, "furnished with albumen, and a double coat." *Brown.*

Obs. Labillardiere and Brown describe some flowers as wanting the stamens, others the pistil, though the rest have both. In this polygamous character, but especially in the nature of the fruit, which is a true *bacca*, this genus differs from **CHENOPODIUM**, as well as from **KOCHIA**, and other neighbouring genera, of Mr. Brown; see those articles. The stamens are sometimes fewer than five. *Brown.*

Ess. Ch. *Calyx* inferior, in five deep segments. *Corolla* none. Berry depressed, encompassed with the permanent calyx. *Seed* solitary, orbicular, depressed. Some male or female flowers are interspersed.

The species, all natives of New Holland, are generally shrubby, rarely herbaceous. *Leaves* almost always alternate, simple, often clothed with mealy powder. *Flowers* either spiked or conglomerated, destitute of *bracteas*.

1. *R. Billardieri*. (*Chenopodium baccatum*; Labill. Nov. Holl. v. 1. 71. t. 96.)—Shrubby, erect, without thorns. Leaves entire, linear-oblong or lanceolate, flat; powdery beneath. Spikes branched. Native of New South Wales, as well as of the southern coast of New Holland. *Stem* shrubby, branched, five feet or more in height, with round, leafy branches, striated when dry. *Leaves* stalked, spreading, an inch and a half, or two inches, long, and one-third of an inch broad, sharpish; tapering at the base. *Flowers* small, greenish, in terminal, much compounded, or paniced, spikes. *Berries* red, about the size of mustard-seed.

2. *R. crassifolia*.—Shrubby, erect, without thorns. Leaves entire, oval, or linear-oblong, fleshy, convex and powdery beneath. Spikes branched.—Gathered by Mr. Brown, on the south coast of New Holland.

3. *R. limifolia*.—Somewhat shrubby, decumbent. Leaves entire, linear-lanceolate, flat, stamens one or two. Found by the same botanist, in the tropical part of New Holland.

4. *R. hastata*. Ait. n. 1.—Somewhat shrubby, erect. Branches diffuse. Leaves nearly opposite, hastate, somewhat rhomboid, entire, very smooth. Spikes terminal, leafless.—Native of New South Wales, from whence it was sent to Kew by Mr. Peter Good, in 1803. This is a hardy shrub, flowering with us in June and July, and appears to be the only species of the genus before us, that has, as yet, been cultivated in England.

5. *R. parabolica*.—Shrubby, erect, without spines. Leaves triangular, obtuse, powdery. Spike branched.—Observed by Mr. Brown, on the south coast of New Holland, but without fruit.

6. *R. spinifera*.—Shrubby, erect; the young branches becoming spines. Leaves partly opposite, hastate, somewhat rhomboid, entire; powdery and hoary on both sides. Spikes simple.—From the south coast.

7. *R. nutans*.—Herbaceous, prostrate. Branches ascending when in fruit, drooping at the extremity. Leaves opposite, lanceolate-hastate, acute.—Gathered by Mr. Brown,

on the fourth coast of New Holland, as well as in Van Diemen's island.

RHAGOIDES, ῥαγοειδης, in *Anatomy*, the second coat or tunic of the eye; more usually called uvea.

It has its name rhagoides, as resembling a grape-stone.

In the tunica rhagoides is the hole called the pupil.

RHAHAANS, in *History*, a name given to the priests of the Birman empire, to whom are assigned kioums, or convents; which are different in their structure from common houses, and much resemble the architecture of the Chinese. These buildings are constructed of wood; the roof is composed of different stages, supported by strong pillars; the inside comprehends one large hall; the whole house is open at the sides; some are curiously carved with various symbolic representations of the divinity. There are no apartments for the private recreation of the Rhahaans; publicity being the prevailing system of conduct among the Birmans, who admit of no secrets either in church or state. From the number of convents in the neighbourhood of Rangoon, the Rhahaans and Phonghis, who are an inferior order of priests called Tallapoins, are presumed by colonel Symes to exceed 1500; including in this estimate those in their novitiate. The age of induction into these convents, is generally from eight to twelve years, and young persons are introduced into them with great formality and ceremony. Parents vie with each other in obtaining this honour for their children, and spare no cost on the occasion of their admission; the principal charge consisting in entertainments, and the customary presents to the Rhahaans. When a boy is to be introduced into a convent, either as a temporary resident, or with a view to future consecration, his friends prepare their offerings of cloth, rice, preserves, fruit, fans, cushions, mats, and household utensils. On an appointed day he parades the streets, dressed in yellow, and mounted on a horse richly caparisoned, led by two servants: a band of music goes before, and a party of Rhahaans encircle him: his male friends follow in a troop, and the females of their families bring up the rear, the latter carrying on their heads the offerings meant for the Rhahaans. Thus they proceed to the convent of which the novice is to become a member, where he is presented in form to the senior of the brotherhood. This ceremony is repeated three times, and at each perambulation, fresh presents are to be provided.

The Rhahaans, like the Carmelites, go barefooted, and have their heads close shaven, on which they never wear any covering. Yellow is the only colour worn by the priesthood: they have a long loose cloak, which they wrap round them, so as to cover most part of the body; they profess celibacy, and to abstain from every sensual indulgence. The prescribed punishment for a Rhahaan detected in an act of incontinence is, expulsion and public disgrace; the delinquent is seated on an ass, and his face daubed with black paint interspersed with spots of white; he is thus led through the streets, with a drum beating before him, and afterwards turned out of the city: but such instances of degradation are very rare. The juniors are restricted from wandering about licentiously, either by day or night. There is a prior in every convent, who has a discretionary power to grant permission to go abroad.

The Rhahaans never dress their own victuals, holding it an abuse of time to perform any of the common functions of life, which, so long as they occupy, must divert them from the abstract contemplation of the divine essence. They receive the contributions of the laity ready cooked, and prefer cold food to hot. At the dawn of the morning they begin to perambulate the town, to collect supplies for the day: each convent sends forth a certain number of its members,

who walk at a quick pace through the streets, supporting with the right arm a blue lackered box, in which the donations are deposited; these usually consist of boiled rice mixed with oil, dried and pickled fish, sweetmeats, fruit, &c. During their walk, they never cast their eyes to the right nor to the left, but keep them fixed on the ground; they do not stop to solicit, and seldom even look at the donors, who appear more desirous to bestow, than the others to receive. The Rhahaans eat but once a day, at the hour of noon. A much larger quantity of provision being commonly procured than suffices for the members of the convent, the surplus is disposed of, as charitably as it was given, to the needy stranger, or the poor scholars who daily attend them to be instructed in letters, and taught their moral and religious duties.

In the various commotions of the empire, colonel Symes says, that the Rhahaans take no active share, nor do they publicly interfere in politics, or engage in war: by this prudent conduct they excite no resentment: the Birmans and Peguers professing the same religion, the conquerors, to whichever party they belonged, equally respected the ministers of their faith. The head of the Rhahaans at Rangoon, called Seredaw, is treated with great veneration. He lives in a very handsome monastery half a mile from the town, on the road leading to Shoedagon, or temple. He is in no respect distinguished, as to his outward appearance, from the common Rhahaans. He goes every day, at the same hour, to the temple, to offer his devotions, and performs the journey, which is about four miles, on foot. In his conversation with Symes he betrayed a worldly pride inconsistent with his years (being about seventy-five) and sacred function: he announced, with much pomp, that he was the head of the church at Rangoon, and ostentatiously displayed, engraven on iron plates, his sacerdotal titles, which had been conferred on him by the present and the late king. Formerly there were nunneries of virgin priestesses, who, like the Rhahaans, wore yellow garments, cut off their hair, and devoted themselves to chastity and religion; but these were not long ago abolished, as being injurious to the population of the state. At present there are a few old women, who shave their heads, wear a white dress, follow funerals, and carry water to the convents; and these venerable dames are treated with some portion of respect. Symes's *Ava*, vol. ii.

RHAIADAR, or RHAYADER, in *Geography*, a borough and market-town in the cwmwd of Glynn-Jeithon, cantref of Maelynydd (now called the hundred of Rhayader), county of Radnor, South Wales, is situated on the banks of the river Wye, at the distance of 20 miles N.W. from New Radnor, and 176 W.N.W. from London. This place is a borough by prescription, and lays claim to a very high antiquity. It is governed by a bailiff, who is annually elected at a court-leet, held in the town-hall, at which also the burgesses are chosen by a town jury. Rhayader is one of the five contributory boroughs to return a representative to serve in parliament for the town of New Radnor. This place was formerly of much greater consequence and extent than at present. On Cefn-Ceido, about half a mile to the north-east, is a tract of land, called Pant-yr-Eglwys, where, according to tradition, a church anciently stood, which was included within the precincts of the borough. The great sessions for the county were at one time held here; and the county-court alternately met at New Radnor and Rhayader, till removed from the latter place to the town of Presteigne, in the reign of Henry VIII. The gaol for the security of criminals then stood on a spot of ground now occupied by a Presbyterian meeting-house; and the place of execution was

at the north end of the town, near a house known by the appellation of Pen-y-Maes. At present Rhayader consists of four streets which intersect each other at right angles, and lie nearly parallel to the four cardinal points. In the wide space formed by the intersection of these streets stands the town-hall, which is a handsome building, rebuilt by subscription in 1762. The church is a plain structure, ornamented with a tower at one end; besides which there is a place of worship for Presbyterians and another for Methodists. The grammar-school was erected A.D. 1793, and has an endowment for the education of a limited number of poor children. The borough of Rhayader is a distinct parish of itself, and is exempt from the payment of county rates. The market-day here is Wednesday, weekly; and there are fairs on the 6th and 27th of August, 26th September, 14th October, and 3d December, for horses, sheep, and cattle; besides three great markets in May. The chief support of this town arises from the manufacture of woollens, principally flannel. According to the population returns of 1811, the parish contained 97 houses and 446 inhabitants.

On an eminence to the N.W. of the town stood the ancient castle of Rhayader, which was erected, in the year 1178, by Rhys-ap-Gruffydd, prince of South Wales, in order to check the incursions of the Normans, who, at that period, made great irruptions in the marches of Wales. In 1194, prince Rhys having been surprized and taken prisoner by his own sons, this castle was besieged and compelled to surrender to the sons of Cadwalhon-ap-Madawe of Maelienydd, by whom it was fortified for their own use. In the year 1231, after Llywelyn, prince of North Wales, had taken and destroyed the castle of Montgomery, he marched hither, and visited the castle of Rhayader with a similar fate. It was rebuilt, however, and continued to be a place of defence till the civil wars in the seventeenth century, when it was dismantled and totally destroyed; the fosse by which it was surrounded being the only vestige of it remaining at the present day. The tower, or citadel, stood in a direct line between the castle and the gaol, overlooking the river. The mount adjacent is still denominated Tower-hill. Near this place a stone bridge is thrown over the Wye, which the Welsh call Rhaidr-Gwy, in allusion to the rumbling noise its impetuous waters make amidst the rocks. The only religious house, recorded to have been situated at Rhayader, was a convent of Dominican, or Black friars, founded soon after their first arrival in England, A. D. 1221. This house was suppressed in the 31st year of king Henry VIII.

In the immediate vicinity of Rhayader, the scenery of the Wye is peculiarly grand. Raging in its rocky bed, this river is seen through the light foliage of impendent trees, sometimes precipitating its waters over a bold ledge of rock, and sometimes searching its way among protruding crags, in a contracted sheet of glistening foam. The mountains by which the vale of Rhayader is environed, display a wild and rugged character, and are noted, according to local tradition, as being the place of shelter in which king Vortigern eluded the search of Hengist, after his alleged murder of the British nobles at Stonehenge. These hills abound with various kinds of minerals, particularly lead and copper. There are several cairns in this neighbourhood, the most remarkable of which is that of Tommen Sant Ffraid, on the S.W. side of the town, in the parish of Cwm-y-dan-Ddwr, supposed to be the cemetery of Saint Ffraid, the Popish tutelary saint of that parish. Carlisle's Topographical Dictionary of Wales, 4to. 1811. A Tour throughout South Wales and Monmouthshire, by J. T. Barber, F.S.A. 8vo. 1803.

RHAIDR, a river which rises in the E. part of Merio-

nethlure, North Wales, and runs into the Severn on the borders of Shropshire.

RHAIR, a considerable river of Hindoostan, which runs by the south side of Shawpour. The stream, which is about 100 yards wide and four feet in depth, dashes with great rapidity over a bed of rock; which prevents its being navigable for large boats. This river rises in the hills and forests of Surgooja, and after being joined by the Bijool and Gutaun, falls into the Soane near Agowry.

RHAMNÆ, or RHANNÆ, in *Ancient Geography*, a people of India, in the mountains near the river Namadus. Ptolemy.

RHAMNI, in *Botany*, a natural order of plants in Jussieu, being the 95th in his series, or the 13th of his 14th class, and owing its name to the principal genus. See RHAMNUS.

See the character of the class under FICOIDEÆ. The order is thus defined.

Calyx inferior, of one leaf, with a definite number of segments in the limb. *Petals* five, rarely four or six, and very rarely wanting, inserted into the upper part of the calyx, or into its disk, either opposite to, or alternate with, its segments, and equal to them in number; sometimes resembling little scales, and furnished with claws; sometimes united by their broad bases. *Stamens* of the same number as the petals, and inserted into the same part, either alternate with them, or opposite to them. *Germen* superior, encompassed below with the disk of the calyx. *Styles* either solitary, or of some definite number. *Stigmas* one or more. *Fruit* superior; in some instances pulpy, either with many cells, or many nuts, the cells, or nuts, single-seeded; in other cases capsular, of many cells and many valves, the partitions from the middle of each valve, and the cells containing either one or two seeds. *Coraculum* flat and straight, surrounded with a fleshy albumen. *Stem* arboreous or shrubby. *Leaves* either alternate or opposite, accompanied by *stipulas*, that are often very minute.

Section 1. *Stamens alternate with the petals. Fruit capsular. Staphylea; Euonymus; and Celastrus* of Linnæus; with *Polycardia* of Lamarck.

SECT. 2. *Stamens alternate with the petals. Fruit a drupe or berry.* Some genera of this section have the petals connected by their broad base.

Myginda; Goupia of Aublet, which is *Glossopetalum* of Schreber; *Rubentia* of Commerçon, certainly the same genus with Jacquin's *Eleodendrum*, as Jussieu indeed suspected; *Cassine; Schrebera* of Linnæus, a genus founded altogether in error, as we shall explain in its proper place; *Ilex; and Prinos.*

SECT. 3. *Stamens opposite to the petals. Fruit drupaceous.* *Mayepea* of Aublet, erroneously placed here, as belonging really to the *Jasmineæ* (see MAYEPEA); *Samara; Rhamnus; Ziziphus; Paliurus;* the two last separated from the Linnæan *Rhamnus*, by Jussieu. See PALIURUS.

SECT. 4. *Stamens opposite to the petals. Fruit three lobed.* *Colleita* of Commerçon, Lamarck Illustr. t. 129; *Ceanothus; Hovenia; and Phyllica;* to which is to be added LASIOPETALUM; see that article.

SECT. 5. *Genera akin to Rhamni, their germen mostly superior.*

Brunia of Linnæus, some of whose reputed species have the germen superior, others inferior; and *Bumalda* of Thunberg.

SECT. 6. *Genera akin to Rhamni, but differing in having an inferior germen.*

Gouania; Pletronia, dubiously admissible here, as we have observed in its proper place; *Carpodetus* of Forster; *Aucuba*

Aucuba of Thunberg; and *Glossoma* of Schreber, which is Aublet's *Votomita*.

RHAMNOATZ, in *Geography*, a town of Sweden, in Westmannland; 20 miles N. of Stroemsholm.

RHAMNOIDES, in *Botany*, a name given by Tournefort, and others, to a genus of plants, called by Linnæus *hippophae*; which see.

RHAMNUS, in *Ancient Geography*, a borough of Attica, belonging to the Ajantide tribe, 60 stadia from Marathon, in a northerly direction from the Ægean sea, in a place where the land formed a small peninsula or Chersonesus. The houses were on the sea-coast; and upon an eminence was the temple of Nemesis, in which was a fine statue of the goddess, made by Phidias, of marble, which the Persians had brought from Paros for the purpose of forming a trophy, and which had been found in their camp after the battle of Marathon: the pedestal was adorned with four basso-relievos, representing different subjects of Grecian history. Leda is also exhibited presenting Helena to her mother Nemesis. See NEMESIS.

RHAMNUS, in *Botany*, so called by the ancient Romans, and by the Greeks *ῥαμνος*; words derived, according to De Theis, from the Celtic *Ram*, a head or tuft of branches, which is the origin of the Latin *ramus*, &c. and of the French *Rame*, *ramier*, &c.—Linn. Gen. 105. Schreb. 142. addend. 823. Willd. Sp. Pl. v. 1. 1092. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 261. Prodr. Fl. Græc. Sibth. v. 1. 157. Ait. Hort. Kew. v. 2. 14. Juss. 380. Lamarck Illustr. t. 128. Gærtn. t. 106.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Dumoseæ*, Linn. *Rhamnii*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, urceolate; its limb in five spreading, acute, equal, coloured segments; the base permanent. Cor. Petals five, minute, between the segments of the calyx, opposite to the stamens, converging. Stam. Filaments as many as the petals, awl-shaped; anthers small. Pist. Germen roundish; style thread-shaped, equal to the stamens; stigma in various divisions. Peric. Berry roundish, naked, divided into fewer cells than there are segments of the calyx. Seeds solitary, roundish, gibbous on one side, compressed on the other.

Obs. We follow Jussieu and Schreber (in his addenda) in our denomination of the different parts of the flower, instead of taking the calyx for a corolla, with Linnæus. The genera of *PALMURUS* and *ZIZIPHUS*, separated from the original Linnæan *Rhamnus*, will be found in their proper places. *Fragula* and *Alaternus* of Tournefort have no just pretensions to be removed from the present genus.

Ess. Ch. Calyx urceolate. Petals five, opposite to the stamens. Berry superior.

We shall briefly define the species which authors have retained in *Rhamnus*, adding some new ones. The whole are shrubby, sometimes climbing. *Leaves* simple, undivided, stalked, veiny; mostly alternate. *Flowers* lateral, small, green or yellowish; sometimes with only four segments, petals and stamens, and in that case often dioecious, or polygamous, as in the first section.

Section 1. *Branches armed with terminal thorns.*

1. *R. catharticus*. Purging Buckthorn. Linn. Sp. Pl. 279. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1629. Woodv. Med. Bot. t. 114. Fl. Dan. t. 850. (*R. solutivus*; Ger. Em. 1337, with Clusius's figure of the following species. *Spina infectoria*; Math. Valgr. v. 1. 143.)—Flowers four-cleft, polygamous. Leaves ovate. Stem erect. Berry with four seeds.—Native of woods and hedges throughout Europe, especially in moist situations. This is the white-thorn of the modern Greeks. A rigid bushy shrub, nearly smooth in every part; its branches terminating in strong thorns, *Leaves*

ferrated, with several lateral ribs. *Flowers* from the same buds as the leaves, yellowish-green, mostly, but not altogether, dioecious. *Stigma* four-cleft. *Berry* round, black, very purgative, when unripe affording a yellow dye.

2. *R. infectorius*. Turkey-berry Buckthorn, or Grain d'Avignon. Linn. Mant. 49. Willd. n. 2. Ait. n. 2. (*R. catharticus minor*; Arduin. Mem. 78. t. 14. *R. solutivus minor*; Ger. Em. 1337. *Spina infectoria pumila prima*; Clus. Hist. v. 1. 111.)—Flowers four-cleft, dioecious. Stem procumbent.—Native of the south of Europe. Frequent in rough stony places in Greece, and rightly considered by Dr. Sibthorp as the *Αυκίον*, *Lycium*, of Dioscorides. The unripe berries are much used for dyeing, and imported in great quantities into England. They are what give the yellow colour to Turkey leather, or yellow morocco. This shrub is very nearly related to the first species, but grows procumbent, not erect, and the *leaves* are smaller and narrower. Gerard observes, that the segments of the *calyx* are but the length of the tube; not longer, as in *catharticus*; and that the *stigmas* are two, reflexed. *Fl. Gallopr.* 462. The *stipulas* are linear; not awl-shaped, as in the former; but we dare not rely on that circumstance, without further examination.

3. *R. lycioides*. Box-thorn Rhamnus. Linn. Sp. Pl. 279. Willd. n. 3. Ait. n. 3. Cavan. Ic. v. 2. 66. t. 182. (*R. tertius*, fortè *niger* Theophrasti; Clus. Hist. v. 1. 110. *R. tertius* Clusii; Ger. Em. 1334.)—Leaves nearly linear, obtuse, entire.—Native of Spain; frequent on the limestone hills of Valentia. *Cavan.* Differs widely from both the former in the narrow and entire *leaves*, tapering down into their slender *footstalks*.

4. *R. erythroxylois*. Red-wood Buckthorn. Pall. Ross. v. 1. p. 2. 26. t. 62, and t. 100. f. 8. Willd. n. 4.—Leaves linear-lanceolate, ferrated, rather acute.—Native of dry rocky places in Siberia.—The strongly ferrated and acute *leaves* distinguish this from the last. A variety with smaller, more finely ferrated, *leaves*, is Pallas's *R. lycioides*, t. 63.

5. *R. oleoides*. Olive-leaved Buckthorn. Linn. Sp. Pl. 279. Willd. n. 5. Ait. n. 4. (*R. secundus*; Clus. Hist. v. 1. 110. Ger. Em. 1334.)—Leaves obovate, entire; reticulated with veins beneath.—Native of Spain, *Alfaroemes*; of Barbary, *Desfontaines*; of the southern part of Greece, and the island of Milo, *Sibthorp*. The shorter obovate *leaves*, copiously reticulated with veins, especially at the back, differ materially from those of *lycioides*. The *fruit* moreover has a much shorter stalk, though it is not so perfectly sessile as in Clusius's figure, which nevertheless we cannot hesitate to refer to this species.

6. *R. prunifolius*. Plum-leaved Buckthorn. Sm. Prodr. Fl. Græc. Sibth. n. 549. (*R. creticus*, amygdali folio minor; Tourn. Cor. 41.)—Stem procumbent. Flowers statish, four-cleft, dioecious. Leaves obovate, obtuse, crenate, naked.—Found on the higher mountains of Crete.—Like the last in habit, but distinguished by its crenate, or somewhat ferrated, *leaves*. *Stem* depressed, or procumbent, with many entangled branches. The female *flowers* have occasional rudiments of *stamens*. *Style* cloven half way down. We find no figures referrible to this or the following.

7. *R. crenulatus*. Teneriffe Buckthorn. Ait. n. 5. Willd. n. 6.—Stem erect. Flowers three or four-cleft, dioecious. Leaves elliptic-oblong, bluntly ferrated, permanent.—Native of the Canary islands; *Maffon*. Brought in 1778 to Kew, where it blossoms in the greenhouse in March. A stout, erect, much-branched shrub. The *leaves* are finely reticulated beneath.

8. *R. saxatilis*. Rock Buckthorn. Jacq. Austr. t. 53. Linn. Sp. Pl. 161. Willd. n. 7. Ait. n. 6. (*R. solu-*

tivus pumilus; Ger. Em. 1337. *Spina infectoria pumila secunda*; Cluf. Hist. v. 1. 112.)—Stem spreading. Flowers four-cleft, dioecious. Leaves obovate, acute, serrated, deciduous.—Native of Austria, Switzerland, Italy, and Greece. The rigid branched stems are more spreading or diffuse than those of *R. crenulatus*; the leaves deciduous, much less evidently reticulated. The flowers are pale yellow. *Stigma* in two deep acute divisions. *Berries* black.

9. *R. theezans*. Tea Buckthorn. Linn. Mant. 207. Willd. n. 8. (*R. Thea*; Osbeck's Travels, v. 1. 375.)—Leaves ovate, finely serrated; paler beneath. Flowers in terminal spikes, five-cleft.—Native of China.—A shrub six feet high, with long, roundish, downy, spreading branches; the lateral ones bearing hairy terminal spikes of flowers, and subsequently becoming spinous. Leaves an inch long, somewhat heart-shaped, beset with fine sharp serratures; shining and reticulated above; paler, opaque, and more even beneath. The poor people in China are said to use the leaves as a substitute for tea.

Sect. 2. *Without thorns, or prickles.*

10. *R. Sarcophalus*. Timber Buckthorn. Linn. Sp. Pl. 280. Willd. n. 9. (*Sarcophalus*; Browne Jam. 179.)—Leaves oval, coriaceous, emarginate, entire. Flowers in dense, corymbose, silky tufts.—Native of Jamaica. Browne says it is one of the best timber-woods in the island, and rises generally to a very considerable height. The trunk is often above two feet and a half in diameter, covered with a thick scaly bark. Wood hard, dark-coloured, close-grained. Leaves about three inches long, and two broad, smooth, with a strong mid-rib, and many interbranching veins. Browne's generic name applies to the thick, fleshy, umbilicated nectary, or receptacle of the flower. He describes no petals. The style is cloven, with two acute stigmas. Berry of two cells.

11. *R. ferrus*. Iron-wood Buckthorn. Vahl. Symb. v. 3. 41. t. 58. Willd. n. 10. Mart. n. 10.—“Leaves oblong-ovate, emarginate, membranous, smooth, entire. Flowers in axillary umbels.”—Native of the island of Santa Cruz; *Von Rohr and West*. Branches round, smooth, ash-coloured. Leaves an inch or more in length, very finely ribbed and veined. Umbels on short stalks. Vahl.

12. *R. levigatus*. Polished Buckthorn. Vahl. ibid. Willd. n. 11. Mart. n. 11.—“Leaves oblong, entire, coriaceous, smooth. Flowers axillary, about two together.”—Found in the same island. *West*. Branches round, smooth, ash-coloured. Leaves an inch and half long, paler and yellowish at the edges, especially the younger ones; scarcely veiny on the upper side; not at all so underneath. Flowers two or three together, on very short, simple, smooth stalks. Calyx smooth. Stigmas two. Vahl.

13. *R. tetragonus*. Square-branched Cape Buckthorn. Linn. Suppl. 153. Willd. n. 12. Thunb. Prodr. 44.—“Leaves ovate, entire, smooth, sessile. Branches square.”—Gathered by Thunberg, at the Cape of Good Hope. We have seen no specimen, nor is there any figure of this species.

14. *R. polifolius*. Poley-leaved Buckthorn. Vahl. Symb. v. 3. 41. Willd. n. 13.—Leaves lanceolate, entire; snow-white and downy beneath. Flowers axillary, nearly sessile, mostly solitary.—Supposed to be a native of New Zealand. Branches slender, hoary; downy when young. Leaves hardly an inch long, pointed; smooth and somewhat wrinkled above. Footstalks very short, downy.

15. *R. valentinus*. Valentia Buckthorn. Willd. n. 14. (*R. pumilus*; Cavan. Ic. v. 2. 65. t. 181.)—Leaves roundish-elliptical, minutely crenate, nearly sessile. Flowers four-cleft. Style deeply three-cleft. Berry dry.—Gathered

by Cavanilles, on the mountains of Meca and Palomera, in the kingdom of Valentia, flowering in May. If he be correct as to the nature of the fruit, this is a very distinct species; otherwise its habit is very like *pumilus* hereafter described. The stems are short and depressed. Leaves on very short stalks, and obscurely crenate. Flowers hermaphrodite, four-cleft. Style divided to the base into three parts. Capsule, or dry berry, of three cells.

16. *R. cubensis*. Cuba Buckthorn. Linn. Sp. Pl. 281. Willd. n. 15. Jacq. Hort. Vind. v. 3. 28. t. 49.—“Leaves rugose, entire, downy. Flowers hermaphrodite. Capsule of three cells.”—Native of bushy places near the sea, in the island of Cuba. We have not examined any specimen, but by Jacquin's account, this appears rather to have the fruit of a *Ceanothus*. The petals indeed are opposite to the stamens, which is an important character of *Rhamnus*. The fruit however is not a dry berry, but a true capsule, with elastic valves.

17. *R. colubrinus*. Bahama Red-wood Buckthorn. Linn. Sp. Pl. 280. Willd. n. 16. Ait. n. 7. Jacq. Hort. Vind. v. 3. 28. t. 50. (*Arbor baccifera indica, foliis majoribus splendentibus, flore pentapetalo*; Comm. Hort. v. 1. 175. t. 90.)—Leaves ovate, entire, with rusty footstalks. Flowers monogynous, erect. Capsules three-lobed.—Native of the Bahama islands; introduced into our stoves by Catesby, in 1726. This has also the fruit of *Ceanothus*, to which genus Miller refers it.

18. *R. dauricus*. Daurian Buckthorn. Pall. Ross. v. 1. p. 2. 25. t. 61, catharticus. Willd. n. 17. (*Cornus foliis citri angustioribus*; Amman. Ruth. 200. t. 33.)—Leaves ovate, serrated, veiny; tapering at the base. Flowers four-cleft, dioecious.—Found by Gmelin and Pallas on the banks of the river Argunus in Dauria. The wood is red, and called Sandal-wood by the Russians. The aspect of the shrub is much like *R. catharticus*, but there are no thorns. Pallas's names, pages, and references are wonderfully confused in this, and too many other, parts of his pompous book.

19. *R. alpinus*. Alpine Buckthorn. Linn. Sp. Pl. 280. Willd. n. 18. Ait. n. 8. (*R. n. 823*; Hall. Hist. v. 1. 366. t. 40. *Frangula ora folii serrata*; Hall. Enum. 164. *Alnus nigra baccifera, rugosiflora folio, seu major*; Bauh. Hist. v. 1. 562. *Creutzbeer*; Lonic. Kreuterb. 59?)—Stem erect. Leaves elliptic-oblong, with glandular crenatures; somewhat heart-shaped at the base; veins hairy at the back. Flowers dioecious. Stigma four-cleft.—Native of the alps of Switzerland, Dauphiny, Austria, Carniola, &c. Gathered probably by Dr. Sibthorp on mount Parnassus; see n. 21. A shrub, eight or ten feet high, erect, with a smooth grey bark. Leaves two inches or more in length, broadly elliptical, occasionally obtuse or acute; more or less heart-shaped at the base: finely and regularly crenate throughout, with rounded glandular teeth; smooth, except that the numerous straight parallel veins are hairy beneath, especially at their origin. Flowers copious, axillary, stalked, four-cleft, dioecious. Stigma in four narrow deep segments. Berry black, of three cells, with mostly a seed in each. The female flowers have the rudiment of a style, according to Wulfen in Jacq. Coll. v. 3. 16, but the shrub is nevertheless perfectly dioecious.

20. *R. pumilus*. Dwarf Rock Buckthorn. Linn. Mant. 49. Willd. n. 19. Ait. n. 9. Jacq. Coll. v. 2. 141. t. 11. (*R. rupestris*; Scop. Carn. v. 1. 164. t. 5, bad. Villars Dauph. v. 2. 538.)—Stem prostrate. Leaves somewhat obovate, crenate, smooth on both sides. Stigma three-cleft.—Native of mount Baldus, and the alps of Dauphiny and Carniola. We have gathered it on mount Cenis. This is a small depressed shrub, creeping close to the rocks. The

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leaves are smaller than the last, with broader less numerous crevatures, and we find them also tapering constantly at the base, not inclined to be heart-shaped, as Scopoli and Wulfen (in Jacquin), both represent them. The latter erroneously describes and delineates a simple capitate *stigma*; in our specimens, and those of Villars, that part is deeply three-cleft. We see no reason to believe the *pumilus* of this last author distinct from his *rufesfris*. The *flowers* of our *pumilus* are described, by most writers, as having all perfect *stamens* and *pisils*, but Villars says they appeared to him dioecious.

21. *R. pubescens*. Downy Mountain Buckthorn. Sm. Prodr. Fl. Græc. Sibth. n. 552. Fl. Græc. t. 239, unpublished.—Leaves obovate-rhomboid, villous, nearly entire. Flowers dioecious. Style deeply divided.—Gathered by Dr. Sibthorp on mount Parnassus. This is a knotty, zigzag, spreading, not very upright, *shrub*, vyeing in magnitude with *R. alpinus*, for which possibly Dr. Sibthorp might at one time have taken it, when he made a memorandum of *alpinus* being found on Parnassus; as we observe no specimen in his collection to confirm such memorandum. It is, nevertheless, extremely probable that both species may grow there. The present is very distinct from *alpinus* in having downy, and nearly entire *leaves*. The *flower-stalks* and *calyx* are also downy. *Petals* roundish, concave, found in the *male flowers* only. *Female flowers* on a separate plant. *Style* divided nearly to the base, with only two *stigmas*. This species is more akin to the following than to any of the foregoing.

22. *R. Frangula*. Alder Buckthorn, or Berry-bearing Alder. Linn. Sp. Pl. 280. Willd. n. 20. Fl. Brit. n. 2. Engl. Bot. t. 250. Fl. Dan. t. 278. (Frangula; Camer. Epit. 978. Matth. Valgr. v. 2. 609. Alnus nigra, five Frangula; Ger. Em. 1470.)—Leaves obovate, entire, smooth. Style simple, very short. Stigma cloven.—Native of bushy places in the north of Europe more especially, though Dr. Sibthorp observed it about Constantinople. It flowers, like most of the species of *Rhamnus*, in the spring. The *stem* is shrubby, about four feet high. *Leaves* two or three inches long and about one broad, somewhat pointed. *Flowers* whitish, with very minute *petals* and *stamens*, in the same individuals with the *pisils*. *Style* very short, with two small segments to the *stigma*. *Berry* black, roundish, with seldom more than two *seeds*, though we have seen three, in which case, we presume, there must have been a three-cleft *stigma*. These *berries* are sometimes mixed, by herb gatherers, with those of the true Buckthorn, n. 1, or substituted for those berries; but the smaller number of seeds betrays the deception. Their qualities perhaps differ very little.

23. *R. latifolius*. Broad-leaved Azorian Buckthorn. L'Herit. Sert. Angl. 5. t. 8. Willd. n. 21. Ait. n. 11.—Leaves elliptical, pointed, entire. Calyx hairy. Style simple.—Gathered by Mr. Masson in the Azores. He sent it to Kew in 1778, and it blossoms there in July, being kept in winter under cover. This is a tall upright *shrub*, with round, straight, smooth *branches*. *Leaves* four or five inches long, and two broad; smooth above; paler with hairy ribs, beneath. *Flowers* hairy, axillary, many together, on hairy rusty *stalks*. *Petals* broad at the base. *Stigma* slightly three-cleft.

24. *R. glandulosus*. Madeira Buckthorn. Ait. n. 12. Willd. n. 22. Venten. Malmaif. t. 34.—Leaves ovate, bluntly serrated, smooth; glandular at the base. Stem erect. Flowers racemose. Style in three deep segments.—Native of Madeira, and the Canary islands. Introduced at Kew, by Mr. Masson, in 1785. This has the habit of an *Ilex* or *Phillyrea*. The *leaves* are dark green, smooth, two inches long, more or less, ovate, pointed, rather distantly

ferrated, marked on the upper side, near the base, with two or three glandular spots. *Flowers* yellowish, numerous, on smooth, racemose axillary *stalks*. *Stamens* twice as long as the *petals*. *Style* deeply three-cleft. *Stigmas* simple. We know nothing of the *fruit*.

25. *R. ellipticus*. Oval-leaved Jamaica Buckthorn. Ait. n. 13. Willd. n. 23. Swartz Ind. Occ. v. 1. 497. (R. n. 1; Browne Jam. 172. t. 29. f. 2. Ceanothus reclinatus; L'Herit. Sert. Angl. 6.)—Leaves elliptical, acute, entire; rather villous beneath. Flowers axillary, somewhat umbellate. Style in three deep segments. Berry dry.—Native of bushy places on the mountains of Jamaica. Miller cultivated it in the stove at Chelsea in 1758. Aiton. *Stem* forming a small tree, with spreading or dependent *branches*. *Leaves* two or three inches long, thin, downy on the veins beneath. *Flowers* greenish-white. The *fruit* seems, by Swartz's description, a dry berry, like that of some other species of *Rhamnus*, and not the valvular capsule of a *Ceanothus*, though, when quite ripe and dried, it splits into six parts, as we find it in Browne's specimen. The *petals* however are opposite to the *stamens*.

26. *R. prinoides*. Winter-berry-leaved Buckthorn. L'Herit. Sert. Angl. 6. t. 9. Willd. n. 24. Ait. n. 14. (R. celtifolius; Thunb. Prodr. 44. Celtis foliis subrotundis dentatis, flore viridi, fructu luteo; Burm. Afr. 242. t. 88.)—Leaves ovate, serrated, smooth. Stem erect. Flower-stalks simple. Style slightly three-cleft. Flowers polygamous.—Native of woods at the Cape of Good Hope, where it blossoms in September; as is the case in England, where this shrub was first cultivated by Robert Edward, lord Petre. Its habit is that of a *Prinos*, or *Phillyrea*. The *leaves* are from one to two inches long, pointed; shining above; paler beneath; smooth, except occasional hairiness at the origin of each vein. *Flowers* on simple, slender, axillary *stalks*, several together. *Petals* narrow. This species, except in its *inflorescence*, and the want of glands on the *leaves*, bears a considerable resemblance to the *glandulosus*.

27. *R. myrtacinus*. Wiry Buckthorn. Ait. n. 15. Willd. n. 25.—Leaves heart-shaped, entire. Stem climbing with tendrils. Flowers in axillary umbels. Stigma three-cleft.—Said to be a native of Abyssinia; at least it was brought to Kew, in 1775, by the celebrated traveller Mr. Bruce. It is kept in the stove, and blooms in November. The *stem* is weak, climbing to a considerable extent, by means of simple solitary axillary *tendrils* from the upper part of the branches. *Leaves* an inch long, rather downy beneath, obtuse with a small point, on very short *footstalks*. *Flowers* greenish-white. *Germen* immersed in a snow-white glandular *receptacle*, filling the tube of the *calyx*. As nothing is known of the *fruit*, this plant may possibly prove of the genus *Zizyphus*, to which it seems most akin in habit.

28. *R. alnifolius*. Alder-leaved American Buckthorn. L'Herit. Sert. Angl. 5. Willd. n. 26. Ait. n. 16.—Leaves obovate, pointed, serrated, smoothish, opaque; reticulated beneath. Flowers hermaphrodite. Stem erect.—Native of Pennsylvania, from whence we have a specimen, communicated by the Rev. Dr. Muhlenberg. It has much the aspect of *R. alpinus*, but the *leaves*, as L'Heritier observes, are less shining, and more reticulated; they seem to us more tapering at the base, and not at all heart-shaped.

29. *R. sphaerospermus*. Clear-berried Buckthorn. Swartz Ind. Occ. v. 1. 499. Willd. n. 27.—Leaves oblong, serrated, smooth. Stem erect. Flowers in axillary clusters. Style three-cleft. Berry nearly globular, pellucid.—Native of bushy hills in the more temperate parts of Jamaica, flowering in August.—A small tree, ten to fifteen feet high, with

spreading branches. Leaves pointed, finely veined. Clusters many-flowered, the length of the footstalks. Flowers small, yellowish-green. Style very short. Berry the size of a small pepper-corn, either quite globular, or obscurely three-lobed, pellucid, pale green, with one or three seeds. It ripens in October.

30. *R. hybridus*. Mule Buckthorn. L'Herit. Sert. Angl. 5. Willd. n. 28.—“Leaves oblong, pointed, serrated, scarcely perennial. Stem erect. Flowers male and female on the same tree.”—L'Heritier describes this as having sprung up in a garden, from seeds of *R. alpinus* impregnated by *R. Alaternus*, and partaking of the nature of both parents.

31. *R. Alaternus*. Common Alaternus. Linn. Sp. Pl. 281. Willd. n. 29. Ait. n. 17. (Alaternus 1 et 2; Clu. Hist. v. 1. 50. Ger. Em. 1398.)—Leaves ovate, serrated, coriaceous, smooth. Stem erect. Flowers dioecious, in axillary, somewhat compound, bracteated clusters. Stigma in three deep segments.—Native of the south of Europe. A hardy evergreen shrub in our gardens, flowering in the spring. The leaves are about an inch long, of a shining yellowish-green, and of a thick rigid texture. Flowers copious, yellowish. Berries dark purple, with two or three seeds.

The 30th species of Willdenow, *R. carpinifolius*, adopted from Pallas's Fl. Ross. t. 60, is, we believe, the same tree with *Ulmus nemoralis*, Willd. Sp. Pl. v. 1. 1326, or at least of the same genus. See *ULMUS*.

Sect. 3. Branches armed with prickles.

32. *R. capensis*. Prickly Cape Buckthorn. Thunb. Prodr. 44. Willd. n. 31.—“Prickles solitary. Leaves ovate, notched or entire, smooth. Umbels axillary.”—Found by Thunberg, at the Cape.

33. *R. circumscissus*. Prickly East-Indian Buckthorn. Linn. Suppl. 152. Willd. n. 32.—Prickles solitary, hooked. Leaves obovate, abrupt, emarginate, entire, smooth. Umbels axillary.—Found by Koenig, in the East Indies. Branches angular. Prickles numerous, strong. Leaves almost an inch long, and nearly as broad. Umbels many-flowered. Style simple, short, permanent. Base of the calyx cup-like after the limb is fallen.

RHAMNUS, in Gardening, furnishes plants of the tree and shrub kinds, of which the species cultivated are; the purging buckthorn (*R. catharticus*); the pubescent rhamnus, or buckthorn redwood (*R. colubrinus*); the alder buckthorn, or berry-bearing alder (*R. frangula*); the common Christ's-thorn (*R. paliurus*); the common alaternus (*R. alaternus*); the blunt-leaved buckthorn (*R. jujuba*); the pointed-leaved buckthorn (*R. œnopia*); the shining-leaved buckthorn, or common jujube (*R. zizyphus*); and the Syrian Christ's-thorn (*R. spina Christi*).

It is found that the juice of the unripe berries, in the first sort, has the colour of saffron, and is used for staining maps or paper, being sold under the name of French berries: the juice of the ripe berries, mixed with alum, is the sap-green of the painters; but if the berries be gathered late in the autumn, the juice is purple. The bark affords a beautiful yellow dye.

In the third sort, the berries gathered before they are ripe, dye wool green and yellow; when ripe, blue-grey, blue, and green. The bark dyes yellow, and with preparations of iron, black.

There are two varieties of this sort, the broad-leaved, which has larger and rougher leaves; it grows naturally on the Alps: and the dwarf or round-leaved, which is of humble growth, seldom rising above two feet high; it grows on the Pyrenees.

The fifth is a native of the south of Europe, and of Bar-

bary. The fresh branches or young shoots, with the leaves, will dye wool a fine yellow. It flowers about April. And there are varieties with variegated leaves, commonly called bloated phillyrea by the nurserymen; and with the leaves striped with white and with yellow, called silver and gold-striped alaternus. The latter has the leaves much longer and narrower, and the serratures on the edges much deeper: this shoots its branches more erect, forms a handsome bush, and is equally hardy. It is likewise observed, that the phillyrea is sometimes different; and according to some, there are also the large-growing, the small-growing, the broad-leaved, the narrow-jagged-leaved, the yellow-striped jagged-leaved, the white-striped jagged-leaved: all which are confounded with the alaternus, by such persons as are not botanists; but they may easily be distinguished by the position of their leaves, which are alternate in this, but placed opposite by pairs in that. And it is supposed, that the alaternus was much more in request formerly than at present, having been planted against walls in court-yards to cover them, as also to form evergreen hedges in gardens; for which purpose it is very improper, as the branches shoot very vigorously, and being pliant, are frequently displaced by the wind; in winter, when much snow falls in still weather, the weight of it often breaks the branches; these hedges must also be clipped three times in a season to keep them in order, which is both expensive and occasions a great litter in a garden.

The fruit, in the eighth sort, is sold in the market at Canton during the autumn. In Italy and Spain it is served up at the table in deserts during the winter season, as a dry sweet-meat.

And the common or cultivated jujube, according to Miller, has a woody stalk, dividing into many crooked irregular branches, armed with strong straight thorns, set by pairs at each joint; the leaves are two inches long and one broad, slightly serrate, on short footstalks; the flowers are produced on the side of the branches, two or three from the same place, sessile, small and yellow: the fruit oval, the size of a middling plum, sweetish and clammy, including a hard oblong stone, pointed at both ends.

The wild jujube has slender woody stalks, which send out many weak branches, covered with a greyish bark, and armed with spines in pairs, one longer and straight, the other short and recurved; the leaves small, oval, veined, half an inch in length and breadth, and sessile. It is found about Tunis in Africa.

Method of Culture.—The first, third, and fourth sorts may be increased by seeds, layers, and sometimes by cuttings; the seeds should be sown in autumn as soon as ripe, on a bed of light earth, and slightly raked in: the plants mostly appear in the following spring, and when they have had a year or two's growth, they should be planted out in nursery-rows, to have two or three years more growth, when they may be finally set out where they are to stand.

It may be noticed that the layers should always be made from the young shoots, and be laid down in the autumn, in the usual way, giving a little twist or nick at the time in the bark, at a joint. They mostly become well rooted in twelve months afterwards.

Cuttings of the first and third sorts may be made from the young twigs, and be planted in rows in the autumn, in a bed of good earth, when most of them will succeed and grow well.

And all the evergreen or alaternus kinds may be raised from seeds and by layers. The plain sorts succeed in both methods, but the variegated sorts only with certainty by layers, well laid down.

And the seeds should be put into the ground in the early autumn in the same manner as above; and the layers laid down in the autumn as in the other kinds of plants.

All the other species may be raised by sowing the stones of the fruit in pots in spring, plunging them in a moderate hot-bed. When the plants have attained some growth they should be removed into separate pots, and be managed as other tender plants. They also succeed by suckers from the roots and layers, as in the above sorts. And the sixth and eighth sorts may be placed in the greenhouse, and the others in the stove.

These are all ornamental plants; the hardy sorts for the pleasure-ground, and the more tender sorts for the greenhouse and stove, among other potted plants of these departments.

RHAMNUS catharticus, or *spina cervina*, purging buckthorn, in the *Materia Medica*. The fruit or berries of this shrub, which have been long received into the materia medica, are about the size of a small pea, and, when ripe, of a shining black colour; they contain a pulpy deep green juice, called by the French "verd de vessie," or *SAR-green* (which see), which has a faint unpleasant smell, and a bitterish, acrid, nauseous taste; they operate briskly by stool, and hence the plant derives the trivial name "catharticus:" their purgative effects are constantly accompanied with considerable thirst, and dryness of the mouth and throat, and frequently with severe griping of the bowels, especially unless some diluting liquor be plentifully drunk immediately after taking them. The dose is said to be about 20 of the fresh berries in substance; twice or thrice that number in decoction; a drachm or a drachm and a half of the dried berries; an ounce of the expressed juice; or half an ounce of the rob or extract, obtained by inspissating the juice. The juice made into a syrup is the official preparation, and in this state it has been generally preferred by physicians, who found that in doses of one ounce or two it proved a very powerful purgative; and was therefore much employed as a hydragogue. Few patients, however, are able to bear a frequent repetition of this medicine; and even Sydenham, who was partial to the purgative treatment of hydropical diseases, found that other cathartics more effectually answered this purpose. At present it is rarely prescribed, except in conjunction with other medicines of this class. Lewis's *Mat. Med.* Woodville's *Med. Bot.*

RHAMNUSIA, in *Mythology*, an appellation given to Nemesis, on account of her celebrated statue at Rhamnus, in Attica, which has been generally ascribed to Phidias. Pliny, however, gives the honour of it to Ageracritus, a scholar of Phidias, who, as he says, had designed it for a Venus; but seeing one preferred to it, which was executed by Alcamenes, another scholar of the same master, sold his to the Rhamnusians, on condition that they would only take it for a statue of Nemesis, whence she gained the name of Rhamnusia. See **NEMESIS** and **RHAMNUS**.

RHANDÆ, in *Ancient Geography*, a people of Asia, in Drangiana, on the confines of Asia. Ptolemy.

RHANTERIUM, in *Botany*, so named by Desfontaines, from *ῥαντήριον*, a kind of brush for sprinkling water, like that used in Catholic churches; the down, or crown, of the seed having a similar form.—Desfont. *Atlant.* v. 2. 291. Willd. *Sp. Pl.* v. 3. 2105.—Class and order, *Syngenesia Polygamia-superflua*. Nat. Ord. *Compositæ discoideæ*, Linn. *Corymbifera*, Juss.

Gen. Ch. *Common Calyx* imbricated, nearly cylindrical; scales lax, recurved. *Cor.* compound, radiated; florets of the disk numerous, equal, funnel-shaped, five-cleft, erect, all perfect; those of the radius few, ligulate, three-toothed, recurved, female. *Stam.* in the perfect florets five, awl-

shaped, short; anthers simple, united into a five-toothed cylinder. *Pist.* Germen in all the florets inversely conical, furrowed; style thread-shaped, the length of the stamens; stigmas two, club-shaped. *Peric.* none, except the permanent calyx. *Seeds* of all the florets the shape of the germen; those of the disk crowned with from four to six bristles, thickened and feathery at the top; those of the radius naked. *Recept.* flat, chaffy; scales acute, hollowed on one side.

Ess. Ch. Receptacle chaffy. Seed-down of about five bristles, feathery at the top. Calyx cylindrical, imbricated, Seeds of the radius naked.

1. *R. suaveolens*. Desfont. *Atlant.* v. 2. 291. t. 240.—Found by Desfontaines on the sandy sea-coast, near Sfax, in the kingdom of Tunis. *Root* perennial. *Stem* erect, much branched, round, leafy, one or two feet high. *Branches* slender, downy, striated, often entangled together. *Leaves* scattered, sessile, three quarters of an inch long, lanceolate, acute, strongly serrated, either smooth or downy; the upper ones smaller, linear and entire. *Flowers* terminal, solitary, resembling those of several of the smaller-flowered American Aiters, except in being entirely yellow. This plant flowers in summer. The bruised leaves have a fragrant smell.

RHAPHANEÆ, in *Ancient Geography*, a town of Asia, in Syria, placed by Ptolemy between Epiphania and Anterodus.

RHAPHIS, in *Botany*, so called from *ῥαπίς*, a needle, or awl, because of the long needle-like awn of the female flowers.—Lour. *Cochinch.* 552.—Class and order, *Monocotyledon Triandria*. Nat. Ord. *Gramina*.

Gen. Ch. Male flowers two, stalked, in one common involucre. *Cal.* Glume single-flowered, of two awl-shaped, coloured, beardless, nearly equal valves. *Cor.* Glume of two lanceolate, membranous, fringed, beardless valves, shorter than the calyx. *Stam.* Filaments three, short; anthers oblong.

Female flower solitary, in the same short, one-leaved, hairy involucre, sessile, below the male flowers. *Cal.* as in the male, but shorter. *Cor.* Glume of two valves, nearly equal to the calyx; one of them furnished with a longish, very sharp awn. *Pist.* Germen ovate; styles two, short; stigmas feathery. *Peric.* none, except the permanent glumes. *Seed* solitary, oblong, compressed.

Ess. Ch. Involucre of one leaf, three-flowered. Male, Calyx of two valves, coloured. Corolla of two fringed valves.

Female, Calyx like the male. Corolla of two valves: one of them awned. Styles two. Seed one, oblong.

1. *R. trivialis*. (*Gramen aciculatum*, Cusu Cusu; Rumph. *Amboin.* v. 6. book 10. chap. 8. t. 5. f. 1. Co may of the Cochinchinese.)—A very common grass in China and Cochinchina, growing by road sides, and proving very troublesome on account of its seeds, which stick into the clothes of passengers, and cannot be shaken out. Rumphius speaks of it as equally common in the islands of the East Indies. The root is annual, creeping. *Stem* a foot high, erect, round, slender, smooth, scarcely branched, almost leafless, except at the base. *Leaves* nearly all radical, sessile, short, lanceolate, clasping the lower part of the stem. *Panicle* simple, solitary, terminal, conical, lax; its branches long, straight, ascending. Linnæus erroneously cites the above synonym of Rumphius, under his *Panicum colonum*, a widely different plant.

Mr. Brown, in *Prodr. Nov. Holl.* v. 1. 199, suggests that the above plant of Loureiro and Rumphius ought to be referred

referred to the genus *Holcus*, along with all the panicled species of *Andropogon*; and he remarks, on the authority of a specimen from the author, in Sir J. Banks's collection, that it seems scarcely distinct from *Andropogon acicularis* of Retzius, Willd. Sp. Pl. v. 4. 906, for which indeed the same synonym of Rumphius is quoted.

RHAPIS, so called by the younger Linnæus, from *ῥαπίς*, a rod, probably in allusion to the name it has obtained from Europeans in China, of Ground Ratan; but we know not precisely how that name applies to the plant.—Ait. Hort. Kew. ed. 1. v. 3. 473. ed. 2. v. 5. 473. Schreb. 772. Willd. Sp. Pl. v. 4. 1093. Mart. Mill. Dict. v. 4.—Class and order, *Polygamia Monoecia*; rather *Hexandria Monogynia*. Nat. Ord. *Palma*.

Gen. Ch. *Cal.* Perianth inferior, minute, rigid, of one leaf, in three deep, broad, concave, permanent segments. *Cor.* of one petal, larger than the calyx, in three deep, erect, concave, equal segments, deciduous. *Stam.* Filaments six, awl-shaped, nearly as long as the corolla; anthers roundish, two-lobed. *Pist.* Germen superior, three-lobed; style short, awl-shaped; stigma obtuse. *Peric.* Berry roundish-ovate. *Seed* solitary, roundish, bony.

Obs. The flowers are often polygamous or dioecious.

Eff. Ch. Calyx three-cleft. Corolla of one petal, three-cleft. Berry with one large, roundish, bony seed.

1. *R. flabelliformis*. Creeping-rooted Palmetto, or Ground Ratan. Ait. n. 1. Willd. n. 1. Sm. Tour, v. 1. 12. and 279. Jacq. Hort. Schoenbr. v. 3. 36. t. 316. Curt. Mag. t. 1371. (*Chamærops excelsa*; Thunb. Jap. 130.)—Leaves palmate, plaited; their plaits and margins sharply toothed.—Native of China and Japan. *Root* creeping, with numerous long straight fibres. *Stem* rising to a great height in its native country; in our stoves it has not yet reached above six or eight feet; it is clothed with a loose network, formed of the bases of the decayed leaf-stalks. *Leaves* stalked, divided almost to the base into many plaited oblong lobes, a span long, rough at the ribs and edges with prickly teeth. *Flowers* mostly dioecious, yellow, in panicled cylindrical spikes. *Berry* small, dark purple, sweet with a bitterish flavour, barely eatable.

2. *R. acaulis*. Swamp Palmetto. Willd. n. 2. Ait. n. 2. (*Corypha minor*; Jacq. Hort. Vind. v. 3. 8. t. 8. Sabal Adanioni; Gawl. in Curt. Mag. t. 1434. Pursh v. 1. 239.)—Leaves palmate, striated, entire, smooth.—Native of the sea-coast of Carolina and Georgia, flowering in August. Of humble growth, having no leafy stem. The leaves are longer and narrower than in the foregoing, quite smooth and entire. *Flowers* numerous, greenish-white, in numerous, cylindrical, lax, panicled spikes, supported by a straight, round common stalk, taller than the foliage. *Berry* the size of a small pea, black, sweetish. Jacq.

3. *R. arundinacea*. Simple-leaved Palmetto. Ait. n. 3. Willd. n. 3.—Leaves in two deep, acute, plaited lobes; roughish at the edges.—Native of Carolina. A greenhouse plant at Kew, flowering in September.

The orthography of the generic name in Curt. Mag. 1434, is remarkably confused, and seems to have misled Mr. Pursh to print it *Raphis*, citing Willdenow without examination.

RHAPONTICUM. See **RHA**.

RHAPONTICUM, a medicinal root, in form resembling rhubarb, and nearly of the same virtues.

It was called *rhaponticum*, q. d. *root of Pontus*; because chiefly produced in the country of Pontus in Asia.

It is the root of a plant, which is a species of the *rheum*, with smooth roundish leaves, and somewhat channelled pedicles. It grows wild on the mountain Rhodope in Thrace,

from whence it was brought into Europe by Alpinus about the year 1610; it bears the hardest winters of this climate. The root of this plant, says Dr. Lewis, which appears to have been the true rhubarb of the ancients, is confounded by some with the modern rhubarb, though considerably different from that root in appearance, as well as in quality. The rhapsodic is of a dusky colour on the surface, and of a loose spongy texture; more astringent than rhubarb, and less purgative: in this last intention, two or three drachms are required for a dose. Lewis's Mat. Med.

It has, however, been much controverted, whether the rhapsodicum of the ancients, and the rhubarb of the moderns, be one and the same plant: the reasoning on both sides may be seen in the appendix to the second volume of John Bauhin's History of Plants. See **RHUBARB**.

RHAPPHA, in *Ancient Geography*, a town of India, on the other side of the Ganges, among the people called Gangani. Ptolemy.

RHAPSA, a town of Asia, in the interior of Media.

RHAPSODI, *ῥαψῳδοί*, **RHAPSODISTS**, in *Antiquity*, persons who made a business of singing or reciting pieces of Homer's poems.

Cuper informs us, that the rhapsodi were clothed in red, when they sung the Iliad; and in blue, when they sung the Odyssey.

They performed on the theatres; and sometimes strove for prizes, in contests of poetry, singing, &c.

After the two antagonists had finished their parts, the two pieces, or papers they were written in, were joined together again; whence the name, *viz.* from *ῥαπτῶς*, *suo*, I join together, and *ῳδῆς*, *ode*, song.

But there seem to have been other rhapsodi of higher antiquity than these; people who composed heroic poems, or songs in praise of heroes and great men, and sung their own compositions from town to town, for a livelihood; of which profession, it is said, was Homer himself.

Hence, some critics, instead of the former origin, derive the word rhapsodist from *ῥαβδῶν ἄρδην*, *to sing with a laurel-rod in the hand*, which, it seems, was the badge of the primitive rhapsodi.

Philochorus, again, derives the word from *ῥαπτῶν τὰς ῳδὰς*, *q. d. συντίθεσθαι*, *to compose songs or poems*; as if they were the authors of the poems they sung. This opinion, to which Scaliger inclines, reduces these rhapsodi to the second kind.

In effect, it is probable, that they were all of the same class, whatever distinction some authors may imagine among them; and that their business was to sing or rehearse poems, either of their own, or other people's composition, as might best serve their purpose, which was gaining a pecuniary advantage by them. So that we do not apprehend it any injury to them, to set them on the foot of our ballad-singers; some of whom may probably pen their own ditties. After Homer's time, it is no wonder they confined themselves altogether to his pieces, for which the people had the utmost veneration; nor is it surprising, that they should erect stages, &c. and dispute the point of recitation in fairs and markets.

The import of the word rhapsodist underwent several changes in antiquity: it was first appropriated to bards, who sung their own verses from town to town, or at the tables of the great; in this sense Homer was called a rhapsodist. It was next bestowed on those who sung the verses of Homer on the stage, usually for a prize, allotted to the best performer of them; and, lastly, to such singers of centos, as have been just described. A rhapsody, in modern language, conveys no other meaning than that of an incoherent

incoherent jumble of ideas. This sense of the word undoubtedly took its rise from the notorious folly and absurdity of the rhapsodists, in their rapturous comments upon their favourite poets; for they undertook to explain, as well as to recite. Hence it is that in Suidas, the word *ῥαψῳδία* is defined by *ῥαψῳδία, nonsense*.

RHAPSODOMANCY, *ῥαψῳδομαντία*, an ancient kind of divination performed by fixing on a passage of a poet at hazard, and reckoning on it as a prediction of what was to come to pass.

There were various methods of practising this rhapsodomancy. Sometimes they wrote several verses or sentences of a poet on so many pieces of wood, paper, or the like; took them together in an urn; and drew out one, which was accounted the lot.

Sometimes they cast dice on a table, on which verses were written; and that on which the die lodged, contained the prediction.

A third manner was by opening a book, and pitching on some verse, at first sight. This method they particularly called the *sortes Prænestinae*, and afterwards, according to the poet thus made use of, *sortes Homericae*, *sortes Virgilianæ*, &c.

RHAPSODY, *ῥαψῳδία*, in *Antiquity*, a discourse in verse, sung or rehearsed by a rhapsodist.

Others will have rhapsody properly to signify a collection of verses, especially those of Homer; which, having been a long time dispersed in pieces and fragments, were at length, by Pisistratus's order, digested into books, called rhapsodies; from the Greek *ῥαπτω, suo, I sew*, and *ῥῶν, song*.

Hence, among the moderns, rhapsody is also used for an assemblage of passages, thoughts, and authorities, raked together from divers authors, to compose some new piece. Lipsius's *Politics* make such a rhapsody, in which there is nothing of the author's own but conjunction and particles.

RHAPTE, in *Ancient Geography*, the metropolis of the Ethiopians, near the river Raptus. Steph. Byz.

RHATOSTATHIBIUS, or, as Baxter thinks it was originally written, *Retostambius*, a river of the isle of Albion, (England,) on the western side, the mouth of which is placed by Ptolemy between that of the Tobius and the estuary of Sabrina. This is the river Wye, and its ancient name is derived from "Rot in Tav," the course of a river.

RHATTA, a town of Asia, in Babylonia, in the vicinity of Chiriphe. Ptolemy.

RHAUCUS, a town of the island of Crete. Steph. Byz.

RHAVENA, a prefecture of Asia, along the Euphrates. Ptolemy places in it six towns on the banks of the Euphrates, and four in the interior of the country.

RHAVIUM, a river of Hibernia, the mouth of which is placed by Ptolemy between the promontory "Boreum" and the town "Magnata."

RHAUNEM, in *Geography*, a town of France, in the department of the Seine, and chief place of a canton, in the district of Birkenfeld. The place contains 547, and the canton 5886 inhabitants, in 35 communes.

RHAUNETI, in *Ancient Geography*, a town of Arabia Felix, on the Arabian gulf, between the town "Phœnicum" and the extremity of this Chersonesus. Ptolemy.

RHAURARIS, a river of Gallia Narbonensis, according to Strabo. This river is called "Arauricus" by Ptolemy, and "Arauraris" by Pomponius Mela.

RHAUZIUM, the metropolis of Dalmatia, according to Cedrenus and Curopalata.

RHAW, GEORGE, in *Biography*, a learned bookseller and musician of Wittemberg, born in 1494. In 1531 appeared an "Enchiridion utriusque Musicæ Practicæ, ex variis Musicorum Libris congestum," in 8vo. And in 1538 he not only published "Select Harmony for four Voices," consisting of two Latin Passiones, the one by John Galliculus, and the other by Jacob Otrecht, with masses, lamentations of Jeremiah, and motets by John Walther, Lewis Senfels, Simon Cellarius, Benedict Dux, Eckel, Lemlin, Stoel, and Henry Isaac, to which Melancthon furnished him with a Latin preface; but in 1544 published, in oblong quarto, 123 German sacred songs, of four and five parts, for the use of schools. Prefixed to the second part of this publication, containing ecclesiastical hymns, set by sixteen different German composers, there is a print of the editor, Geo. Rhaw, Typographus, Wittemb. anno ætatis suæ LIV.

RHAZES, one of the oldest and most distinguished of the Arabian physicians, was born at Rei, in the province of Chorasan, about the year 852. There was a school in his native town, at which he received his early education; but he is said not to have commenced the study of medicine till somewhat late in life, having given up his time much to the cultivation of music. After he was thirty years of age, he removed to Bagdad, and then he turned his attention to philosophy, and afterwards to physic. He became, however, indefatigable in his application, and was continually occupied in observing, reading, and writing, until he obtained the highest reputation; and he was selected out of a hundred eminent physicians, who were then resident at Bagdad, to superintend the celebrated hospital of that city. The historians considered him as the Galen of the Arabians; and from his long life and constant practice, during which he paid the most assiduous attention to the varieties of disease, he obtained the appellation of the experimenter, or the experienced. He was said also to be profoundly skilled in all the sciences, especially in philosophy, astronomy, and music. He travelled much in pursuit of knowledge, and made frequent journeys into Persia, his native country, and was much consulted by several princes, particularly by Almanzor, the chief of Chorasan, with whom he frequently corresponded, and to whom he dedicated several of his writings. Abi Obaia enumerated two hundred and twenty-six treatises composed by Rhazes, among which the *ten* books, addressed to his patron Almanzor, are mentioned, and therefore are doubtless genuine, although Haly Abbas, who has given an account of him and his works, has not noticed them. This work Rhazes designed as a complete body of physic, and it may be deemed the great magazine of all the Arabian medicine; the ninth book, indeed, which treats of the cure of diseases, was in such general estimation for several centuries, that it was the text-book of the public schools, and was commented upon by the most learned professors. Nevertheless, like the rest of the Arabian writings, it contains very little more than the substance of the works of the Greeks, from whom the Arabians borrowed almost all their medical knowledge. They have, indeed, and Rhazes in particular, given the first distinct account of the *small-pox*, a pestilential malady which the Greeks have no where accurately described, and which is, therefore, generally inferred to have been unknown among that people. This is questionable; but, at all events, the first specific account of the small-pox is to be found in the works of Rhazes. He was the author, also, of the first treatise ever composed respecting the diseases of children. His book on the affections of the joints is interesting, and contains an account of some remarkable cures, effected chiefly by copious blood-letting. He describes the symptoms of hydrophobia very well; and also

also some diseases peculiar to eastern countries, as the ignis pernicius, vena medinensis, &c.; and he first noticed the disease called spina ventosa. Rhazes had the reputation of being a skilful alchemist; the art of chemistry, in fact, originated with the Arabians, and Rhazes is the first, as Dr. Freind has shewn, who mentions the use of chemical preparations in medicine. He has a chapter on the qualifications of a physician; and a singular tract on quacks and impostors, in which he has portrayed that class of pretenders to the life; and his detail of their pretensions shews that they were at least as numerous, and ingenious in their contrivances of cheaterly, as in more recent times.

Rhazes lived to the age of eighty, and lost his sight: he died in the year 932. His works that have come down to us, through the medium of translations in Latin, are, 1. A sort of common-place book, entitled "Continens," or "Libri Continentes." 2. A much more perfect work, the "Libri Decem, ad Almanforem," published at Venice, 1510. 3. Six books of aphorisms, published under the title of "Liber de Secretis, qui Aphorismorum appellatur," Bononiæ, 1489. 4. A tract on the small-pox, often translated, and printed with the title of "De Pestilentia;" the best translation is by Channing, London, 1766. Freind's Hist. of Physic. Eloy Dict. Hist. de la Med.

RHAZUNDA, in *Ancient Geography*, a town of Asia, in the interior of Media, between "Sanais" and "Veneca," according to Ptolemy.

RHEA, a town of Asia, in Margiana, according to Ptolemy.

RHEA, in *Mythology*, one of the titles of Cybele, derived from *rho*, *I flow*, on account of that abundance of benefits which she dispenses.

Rhea was, according to Diodorus Siculus, one of the eight great divinities of Egypt; the other seven being the Sun, Saturn or Chronos, Jupiter, Juno, Vulcan, Vesta, and Mercury. Chronos, says this historian, having married Rhea, became, according to some, the father of Osiris and Isis, and, according to others, of Jupiter and Juno. The children of Rhea, by Saturn, were, according to fabulous history, Vesta, Ceres, Juno, Pluto, Neptune, and Jupiter, the father of gods and men; but that god learning from an oracle delivered by Cælus and Terra, that one of his children should dethrone him, devoured them as Rhea brought them forth, which threw her into extreme distress. So that when she was near her time of being delivered of Jupiter, she consulted her parents to know in what manner she might rescue him from the cruelty of his father, and by their advice she secretly withdrew into Crete, where she was delivered, and presented Saturn with a stone wrapped about with swaddling clothes, which he swallowed. Jupiter being grown up, rescued Cælus from the chains with which Saturn had loaded him; and Cælus, in return for his service, gave him thunder, by which he became the sovereign of gods and men. Rhea was one of the names under which the earth was worshipped.

RHEA *Sylvia*, was the mother of Remus and Romulus; and in order to give dignity to their origin, the fable reports that her uncle Amulius got into her cell, and her father Numitor propagated the story that the twins she brought forth had been begotten by the god of war.

RHEA, in *Ornithology*, a species of the struthio or ostrich, the same bird with the *nan-duguacu* of the Brasils. See STRUTHIO.

RHEBAN, in *Ancient Geography*, a river of Asia, in Bithynia. According to Arrian, the source of this river was on mount Olympus, and its mouth in the Euxine sea, near that of Pissis.

RHECHIUS, a river of Greece, which discharged itself into the sea near Thessalonica. At the mouth of this river Justinian erected a fort called "Artemisa."

RHEDA, in *Geography*, a town of Germany, the capital of a lordship, in the county of Lingen; 10 miles N. of Lipperltadt. N. lat. 51° 47'. E. long. 7° 50'.

RHEDA, a town of Holland, in Guelderland, on the Issel; seven miles N. of Arnheim.

RHEDONES, in *Ancient Geography*, a people of Gaul, in Armorica, according to Cæsar and Ptolemy.

RHEEDIA, in *Botany*, called Vanrheedia by Plumier, in honour of a most illustrious promoter of the study of East Indian plants, Henry Van-Rheede Van-Draakenstein, to whose judgment and munificence, while governor of Malabar towards the latter part of the 17th century, the publication of that splendid work the *Hortus Malabaricus*, in 12 folio volumes, is owing.—Linn. Gen. 260. Schreb. 348. Mart. Mill. Dict. v. 4. Juss. 258. Lamarck Illustr. t. 457. (Vanrheedia; Plum. Gen. 45. t. 18.) Class and order, *Polyandria Monogynia*. Nat. Ord. *Guttifera*, Juss.

Gen. Ch. Cal. none. Cor. Petals four, sessile, obovate, concave, spreading. Stam. Filaments numerous, thread-shaped, longer than the corolla; anthers oblong. Pist. Germen superior, ovate; style cylindrical, the length of the stamens; stigma funnel-shaped. Peric. Berry ovate, thin, of one cell. Seeds three, very large, ovate-oblong, marked with simple or branched lines.

Ess. Ch. Petals four. Calyx none. Berry superior, with three seeds.

1. *R. lateriflora*. Linn. Sp. Pl. 719. (Vanrheedia folio subrotundo, fructu luteo; Plum. Ic. 255. t. 257.)—Native of South America. A tree known only to Plumier, whose figure represents it with large, opposite, stalked, ovate, entire leaves; axillary tufts of numerous, rather small, flowers; and ovate pendulous fruit, about two inches long. Jussieu doubts whether the calyx be really wanting.

Linnaeus does not appear to have ever had a specimen of this plant; nor can we account for his striking out (in Mant. 401.) the observation in his Sp. Pl. for which he has substituted, in Syst. Veg., the following description, taken from some East Indian specimen, as his original manuscript shews, and certainly foreign to the true *Rheedia*. "A tree, with jointed, compressed, even, downy branches. Leaves opposite, stalked, lanceolate, entire, smooth. Poststalks short, downy. Flower-stalks axillary, about three together, three cleft, three-flowered."

Willdenow has omitted this genus, in its proper place, nor have we discovered what he has done with it.

RHEGADORA, in *Ancient Geography*, a town of Asia, in Cappadocia.

RHEGIANUM, a town of Lower Mæsia, on the bank of the Danube. Ptolemy.

RHEGIAS, a town of Asia, in Syria: according to Ptolemy it was in Cyrrhestica, between Ariferia and Ruba.

RHEGIUM, or REGIUM, (*Reggio*), a town of Italy, at the extremity of Bruttium, in the strait of Sicily. In the time of Dionysius the tyrant, the inhabitants of Rhegium formed a league against him, which terminated in a treaty in the year 354. A difference afterwards occurring between them, he besieged the town and took it, after about eleven months, in 365. The conduct of Dionysius during this siege was in the highest degree savage and brutal. Rhegium afterwards became subject to the Romans; but a legion, encouraged by the example of the Mamertins of Messina, revolted in 472, and took possession of the city. After ten years' possession, it was besieged by the Romans, and those who escaped the destruction of the siege, to the

amount of about 300, were carried to Rome, where they were scourged and beheaded. This city suffered much from the earthquake that ravaged Calabria; and even in the time of the Romans it was abandoned by its inhabitants, on account of the calamities which it had suffered; but Cæsar rebuilt it, after having driven Pompey from Sicily. Virgil (l. iii. v. 414, &c.) thus describes it:

“ Hæc loca vi quondam, et vastâ convulsa ruinâ
(Tantum Ævi longinqua valet mutare vetustas)
Dissiluisse ferant, quam protenus utraque tellus
Una foret; venit medio vi pontus, et undis
Hesperium Siculo latus abscedit arvaque et urbes
Littore diductas angusto interluit æstu.”

RHEGMA, a place of Asia, in Cilicia, at the mouth of the river Cydnus. Strabo.—Also, a town of Arabia Felix, on the coast of the Persian gulf, in the country of the Anarites. Ptolemy.

RHEGMA, formed of ῥηγνυμι, *I break*, a word used by the ancients to express any breaking or bursting of a soft part without a wound, but most frequently for abscesses breaking inwardly.

RHEID, in *Geography*, a town of France, in the department of the Roer; 2 miles E. of Gladbeck.

RHEIMS. See **REIMS**.

RHEIN, a town of Prussia, in the province of Natangen, on a lake which communicates with Spirding lake. It has a large fortified castle, and an inferior court of justice; 68 miles S.E. of Königsberg. N. lat. 53° 48'. E. long. 21° 42'.

RHEINAU, a town of France, in the department of the Lower Rhine, situated on the Rhine, and very much reduced by the inundations of the river; 5 miles S. of Straßburg.—Also, a town of Switzerland, in the Thurgau, situated on an island formed by the Rhine, with a convent; 5 miles S.S.W. of Schaffhausen.

RHEINBACH, a river of Saxony, which joins the Loderbach, near Bitterfeld.

RHEINBACH, a town of France, in the department of the Rhine and Moselle, and chief place of a canton, in the district of Bonn. The place contains 1119, and the canton 16,478 inhabitants, in 37 communes.

RHEINBECK, a town of the duchy of Holstein; 10 miles E. of Hamburg.

RHEINBERG, a town of France, in the department of the Roer, and chief place of a canton, in the district of Creveldt; 44 miles N.W. of Cologne. The place contains 1705, and the canton 7166 inhabitants, in 17 communes.

RHEINE, or **REINEN**, a town of Germany, in the bishopric of Munster, on the Embs, near which are some salt springs; 22 miles N. of Munster. N. lat. 52° 21'. E. long. 7° 25'.

RHEINECK, or **RHEINEGG**, a town of Switzerland, and capital of the Rheintal, situated on the Rhine, near its confluence with the lake of Constance, inhabited chiefly by Protestants; 26 miles S.E. of Constance.

RHEINFELDEN, a town of Germany, and lately one of the four forest towns of Austrian Swabia, on the S. side of the Rhine, on the opposite bank of which is a covered way, built like a horn-work, and communicating with the town by means of a bridge; 9 miles E. of Bâle. N. lat. 47° 35'. E. long. 7° 50'.

RHEINFELS. See **RHENFELS**.

RHEINHAUSEN, a town of Baden, in the circle of the Upper Rhine, on the E. side of the Rhine; 3 miles S.E. of Spire.

RHEINMAGEN. See **REMAGEN**.

RHEINSDORF. See **RONSDORF**.

RHEINTHAL, a bailiwick of Switzerland, between the canton of Appenzel and the Rhine, belonging to the nine cantons, about 30 miles long, and from three to eight broad. The country is fertile, and produces excellent wine. The number of inhabitants is about 13,000, who are partly Protestants and partly Roman Catholics.

RHEINWALD, a valley in the country of the Grisons, about 20 miles long, which takes its name from a branch of the Rhine that passes through it.

RHEMAN, or **REMAN**, in *Ancient Geography*, a fortified place of Asia, in Mesopotamia, which belonged to the Romans, according to Ammianus Marcellinus.

RHEMBA, in *Hindoo Mythology*, is a character corresponding in many parts to the popular Venus of the Greeks. Like her she sprang from the foam of the ocean, when churned by the gods and demons for the purpose of obtaining the amrita, or beverage of immortality, as noticed under the articles **KURNAVATARA** and **LAKSHMI**. She is sometimes said to be an incarnation of Lakshmi, consort of Vishnu. More correctly, however, she is stationed in the court of Indra, as the chief of his bands of celestial choristers, named **Apsaras**, **Devangana**, **Gandharva**, &c. The **Apsaras**, or **Uparas**, are the Nereids of the Hindoo Pantheon: having sprung from water, they are called water nymphs, and assist Indra, the Jupiter Pluvius of India, in his regency over aqueous phenomena. (See **UPSARA**.) In the churning process above adverted to, these fair damsels were produced in extravagant numbers, according to the *Ramayana*, viz. 600 millions! “of resplendent and celestial form; adorned with glorious ornaments, and endowed with beauty, youth, sweetness, and every grace.” These interesting offspring of poetical imagination are proverbially elegant and graceful. The three wives of the mortal father of Ramachandra are said, in the work just quoted, to be queens, who, “in elegance of form, rivalled the **Apsaras**.” As the chief of these damsels of Paradise, the subject of this article is sometimes stiled **Rhemba-devi**, or the goddess **Rhemba**.

In Hindoo writings, especially in amatory poetics, allusions frequently occur to the **Uparas**, who correspond also with the fairies of the Persians. Many are mentioned by name, **Rhemba** the oftenest, **Urvashi**, **Tilotamma**, **Menaka**, &c. (See those articles.) Under the name of the last we have given an instance of the use made by Indra of these obsequious fulfillers of his will; for, as well as in the line of singing, dancing, &c. condescensions to the **Indra-dikas**, or the demi-gods, the **Apsaras** are the fascinating disturbers of holy men, when engaged in such fervent austerities as threaten the safety of Indra in his firmamental throne. In explanation of which, it requires to be noticed that Indra was originally a mere mortal; but learning that the throne of heaven was the reward of the man who should, with the prescribed ceremonies, perform one hundred **aswamedhas**, or sacrifices of a horse, he did so, and obtained his dominion, and the name of **Shatkratu**, or he who performs a hundred sacrifices. (See **INDRA**.) His throne he retains until another mortal shall equal or exceed him in this potent stile of propitiation. He is, therefore, always on the watch; and being all eyes, never fails to discover austere saints while performing their rigid duties; when he either steals or defiles the horse intended and sanctified for the next sacrifice, or detaches **Rhemba** or **Menaka**, or some other of his damsels of “fascinating symmetry of form,” who always succeed in exciting emotions incompatible with the required purity of such as aspire to oust Indra from his ethereal throne. See **MENAKA**.

The name Apfara is sometimes written *Uffara*, under which latter word something farther concerning these damsels will be found.

RHENA, in *Geography*, a town of Germany, in the duchy of Mecklenburg; 22 miles W.S.W. of Wismar. N. lat. $53^{\circ} 50'$. E. long. $11^{\circ} 10'$.

RHENANUS, BEATUS, in *Biography*, a learned German, was born at Rheinac in 1485, and died at Strasburgh in 1547. He was corrector of the press for Frobenius, and by that means formed an intimacy with Erasmus. He wrote "A History of Germany," 4to.; "Illyrici Provinciarum utriusque Imperiorum Romano, tam Constantinopolitano Servientis, Descriptio," 8vo. He was also the editor of Velleius Paterculus, and other works.

RHENEIA, in *Ancient Geography*, an island of the Ægean sea, in the neighbourhood of that of Delos. Strabo says that it was deserted, but that it was the place of burial for the inhabitants of Delos; which being deemed sacred, it was forbidden to bury the dead in it. The two isles of Delos and Rheneia are called "Dili or Iddiles."

Rheneia retains its name, and is denominated also Great Delos; it is separated from the famous island of Delos by a strait of about 500 toises. In the middle of this narrow channel are two shoals, called the Great and the Little Ramateari: the ancient Greeks had consecrated the larger to Hecate or Diana, and called it the island of Hecate, or Psammite. Ships, even men of war, find good anchorage near this island. N. lat. $37^{\circ} 10'$. E. long. $25^{\circ} 15'$. See DELOS.

RHENEN, in *Geography*, a town of Holland, in the department of Utrecht, seated on the river Leck; 20 miles N.N.E. of Bois-le-Duc. N. lat. $51^{\circ} 59'$. E. long. $5^{\circ} 30'$.

RHENFERD, JAMES, in *Biography*, a celebrated oriental scholar, was born at Mulheim, in Westphalia, in the year 1654. He went through a course of academical studies at the college of Meurs, a city in the duchy of Cleves, and afterwards travelled for improvement into foreign countries. In 1678, when he was 24 years of age, he accepted an invitation to become rector of the Latin college in the city of Franeker; but upon the condition that, while he held that post, he should be at liberty to deliver lectures on the Oriental languages. He resigned his rectorship and removed to Amsterdam, where some of the most wealthy families in that city employed him in the capacity of tutor, and he enjoyed, at the same time, a favourable opportunity for conversing with learned Jews, and improving his knowledge of rabbinical learning. In the year 1683, a vacancy having taken place in the professorship of the Oriental languages and sacred philosophy at the university of Franeker, by the removal of the famous Vitringa to the theological chair, M. Rhenferd received an invitation to fill it; which he accepted. M. Rhenferd held this post nearly thirty years, during which he had the honour of being thrice chosen rector of the university. He died in 1712, when he was in the 59th year of his age. His learning was general and extensive; but he chiefly excelled in an acquaintance with the Hebrew, including the Rabbinical, the Chaldee, and Syriac. He was author of several learned works, among which the following may be mentioned; "De Antiquitate Characteris hodierni Judaici," 1696, 4to.; in which he endeavoured to establish the claim of the present Hebrew characters to the highest antiquity, and to prove that the Samaritan characters were borrowed from the Hebrews; "Comparatio Expiationis anniversariæ Pontificis maximi in Vet. Test. cum unica atque æterna Expiationis Christi Domini;" "Investigatio Præfectorum et Ministrorum Synagogæ," 1700, 4to.; "Dissertationum

Theologico-philologicarum de Stylo Novi Testamenti Syntagma, quo continentur Olearii, Cocceii, &c. de hoc genere Libelli," &c. 1701, 4to.; "Arabarcha, seu, Ethnarcha Judæorum," 1702, 4to.; "De Statuis et Aris, falsis verique Dei et Hominum Internunciis," in illustration of Exod. xx. 23, 24, 1705, 4to.; "Observationum selectarum ad Loca Hebræa Nov. Test. partes five Disput. Tres," 1705, 4to. &c. In 1706 he commenced the publication of a work, entitled "Rudimenta Grammaticæ Harmonicæ Linguarum Orientalium, Hebrææ, Chaldaicæ, Syriacæ, et Arabicæ," which he did not live to finish.

RHENONES, among the ancient Germans, a kind of garment covering the shoulders and breast down to the middle. It was either entirely made of skins, or covered over with them; the long hair of which being outward, proved a good defence against rain.

RHENUS, in *Geography*. See RHINE.

RHEO-STATICS, is used by some for the statics, or the science of the equilibrium of fluids.

RHERIGONEUS SINUS, in *Ancient Geography*. See RERIGONIAN Bay.

RHESAPHA, a town of Syria, in the Palmyrene, near Cholle. Ptol.

RHESCIPIA, or RESCHIPIA, a town of Asia, in Mesopotamia, upon the banks of the Euphrates, between Bethauna and Agamana. Ptol.

RHESINA, a town of Asia, near Mesopotamia, on the river Aboras. Steph. Byz.

RHETICUS, GEORGE JOACHIM, in *Biography*, an excellent German astronomer and mathematician in the 16th century, and a native of Feldkirk, the chief town of one of the western counties of the Tyrolse, was born in the year 1514. Discovering early an inclination towards the study of the mathematics, he was initiated in the elements of that science at Zurich; whence he removed to the university of Wittemberg: here he took the degree of master of philosophy in 1535, and two years afterwards he was made joint professor of the mathematics and astronomy with the famous REINHOLD. (See his article.) While he was daily rising into reputation by his lectures, he was informed of the hypothesis of Copernicus concerning the revolution of the heavenly bodies; which appeared to him to be so reasonable, that he determined to resign his professorship, and study the doctrine under the instructions of its author. Accordingly, in 1539, he left Wittemberg, and went into Prussia, where he became a disciple of that great man. To the system of Copernicus he soon became an entire convert; and he afterwards assisted his master for some years in his astronomical labours. In vain did he for a long time urge Copernicus, in common with the other friends of that astronomer, to favour the world with his grand work, "De Revolutionibus Orbium Cœlestium." At length, the persuasions of his friends having prevailed upon Copernicus to permit the appearance of his work, the care of editing it was confided to Rheticus, who caused it to be printed at Nuremberg in 1543, in folio. He now began his very elaborate "Canon Doctrinæ Triangulorum," or canon of sines, tangents, and secants, to fifteen places of figures, and to every ten seconds of the quadrant: a design which he did not live to complete. The canon of sines, however, to the same radius, for every ten seconds, and for every single second in the first and last degree of the quadrant computed by him, was published at Francfort in 1613, folio. Upon the death of Copernicus, who lived only a few hours after he received a copy of his printed work, Rheticus returned to Wittemberg, and was again admitted to his post of mathematical and astronomical professor. For some time

after this he taught the mathematics at Leipzig; and he afterwards left Saxony a second time, and went into Poland. In the year 1576, upon the invitation of a Hungarian nobleman, he went to Cassavia in Hungary, where, in consequence of sleeping in a room recently plaitered, he caught a disorder on his lungs, which proved fatal to him in the 63d year of his age. He composed and published "Ephemerides," according to the doctrine of Copernicus, till the year 1551; "Orationes de Astronomia, Geometria, et Physica," &c.

RHETORIANS, RHETORII, a sect, in the fourth century, in Egypt, so nominated from their leader Rhetorius.

His distinguishing doctrine, as represented by Philastrius, was, that he approved of all the heresies before him, and taught that they were all in the right. But what Philastrius mentions of him appears so absurd and ridiculous, that St. Augustine, Hæres. 7, could not persuade himself it was true.

RHETORIC, RHETORICA, formed from *ῥητορικῶς*, of *ῥητορ*, I speak, whence *ῥητορ*, speaker, orator, &c. the art of speaking copiously on any subject, with all the advantages of beauty and force.

Rhetoric is generally considered as the art of persuasion. It attempts to produce conviction concerning some particular object, that it may influence the will to a corresponding determination. It seeks either to arouse the mind to action, or to dissuade it from acting upon the resolutions already taken, or such as are in contemplation. Its immediate employment is not to search after truth, but to render acknowledged or supposed truths influential. It leaves to logic the province of cool investigation, and of drawing legitimate conclusions from admitted premises, without any regard to motives. The rhetorician is solicitous to effect some particular purpose, and calls in the art of reason merely as an auxiliary. He attempts to influence the will by reasoning with the affections; knowing that if they be gained over to the party espoused, the will is ready to follow. He, therefore, artfully conceals, or slightly passes over, every circumstance which is not favourable to his views, and brings forwards and largely expatiates upon those which are. He suggests motives of pleasure, utility, safety, honour, pity, &c. as the subject admits. He not only pre-supposes the object in view of the first importance, but he employs every method to implant this conviction in the minds of those whom he endeavours to persuade. These attempts become most successful by a close imitation of that train of ideas, and those modes of expression, which any particular passion or affection is prone to suggest. If the design be to excite *anger* and *resentment*, rhetoric imitates the language of anger. It places the supposed offence in the strongest point of view, and describes it in the most vivid colours. It assiduously collects and expatiates upon every circumstance which contributes to the aggravation of the crime. It is indignant against that spiritless tranquillity which can patiently endure such insults, and attributes reluctance to revenge to mean and cowardly motives. If its object be to excite *horror*, it assembles together every circumstance which has a tendency to alarm with a sense of danger. It stigmatizes courage with the epithet of rashness, and flight is dignified with the title of prudence, &c. If *compassion* be the object, it expatiates upon the wretched state of the sufferer; his fears, his apprehensions, his penitence. It palliates his faults, extols his good qualities, and thus collects, in one point of view, all his claims on commiseration. The species of argument, which persons under the influence of passions and strong affections perpetually adopt, is rendered more efficacious by appropriate language.

The rhetorician, therefore, studies and imitates the particular language of each passion, either in its energy, vivacity, or diffuseness. Hence he liberally employs all those tropes and figures of speech which nature suggests, and art has classified.

Oratory adds to rhetorical composition the advantages of *elocution*. It adapts the manner of delivery to the nature of the subject and the appropriate language. It takes the characteristic signs of each emotion for its model, as far as it dares to imitate, without the imputation of mimicry; it enters into the attitudes, gestures, tones of voice, accents, emphases, expressions of countenance, inspired by the particular emotion, in such a manner, that not an idea is suffered to lose its proper effect, by any deficiency in kind or degree of energy communicated to it; and thus it enjoys every advantage to be derived from the power of sympathy.

Eloquence, according to the modern ideas of it, appears to be the medium between the impetuosity which oratory admits, and which was highly characteristic of ancient oratory, and the studied artifice of the professed rhetorician. The term is sometimes applied to *composition*, and sometimes to *delivery*. When applied to both, it comprehends a certain degree of elegance, both of diction and of manner. The want of that energy which approaches to violence, is compensated by pertinency of language, fluency of utterance, and guarded chastity of address. In a word, its excellency consists in a pleasing adaptation of language to the subject, and of manner to both. It refuses too close an imitation of the turbid emotions, but it delights in animated description. It seems rather partial to the pathetic; the elegance and graces which it loves, harmonize most easily and successfully with the softest and finest feelings of our nature. (Cogan on the Passions.) See ELOCUTION, ELOQUENCE, and ORATORY.

RHETORIC, *Characters in*. See CHARACTER.

RHETORICAL NUMBERS. See NUMBERS.

RHETORICAL *Accent*, among *Hebrew Grammarians*. See ACCENT.

RHETORICIAN. See ORATORY.

RHEU, LA, in *Geography*, a town of France, in the department of the Ille and Vilaine; five miles W.S.W. of Rennes.

RHEUM, in *Botany*, a name derived, as Linnæus supposes, from *ῥεω*, to flow, on account of its active medicinal properties. The *ῥευ*, or *ῥζ*, of Dioscorides is probably of this genus, and the origin of the name.—Linn. Gen. 201. Schreb. 271. Willd. Sp. Pl. v. 2. 488. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 430. Juss. 82. Gærtn. t. 119. Lamarek Dict. v. 6. 192. Illustr. t. 324. (Rhabarbarum; Tournef. t. 18.) Rhubarb.—Class and order, *Enneandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Polygonæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, narrowed at the base, withering, but permanent, cloven into six obtuse segments, alternately smaller. *Cor.* none, except the three inner segments of the calyx be considered such, as in *Rumex*. *Stam.* Filaments nine, capillary, equal in length with the calyx, and inserted into it; anthers twin, oblong, obtuse. *Pist.* Germen superior, short, triangular; styles scarcely any; stigmas three, reflexed, feathery. *Peric.* none. *Seed* solitary, large, triangular, acute, with membranaceous margins.

Ess. Ch. Calyx six-cleft, permanent. Seed one, triangular.

1. *R. Rhaponticum*. Rhapontic Rhubarb. Linn. Sp. Pl. 531. Alpin. Rhapont. 1. t. 1.—"Leaves obtuse,

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smooth; veins somewhat hairy beneath; the sinus dilated at the base; stalks furrowed on the upper side, rounded at the edge."—Native of Asia, and cultivated, like all the other species (except *Leucorrhizum*), at Kew, where they mostly flower in May and June.—*Root* large and thick, much divided, reddish-brown on the outside, yellow within. *Stems* from two to three feet high, jointed, purple. *Leaves* not expanded at first, but folded, smooth, roundish heart-shaped, on thick, reddish, channelled stalks, which have an acid flavour, and are used for making tarts. *Flowers* white, forming a thick, obtuse, dense tuft, which becomes a panicle of large, triangular, brown seeds.

2. *R. undulatum*. Waved-leaved or Chinese Rhubarb. Linn. Sp. Pl. 531. Amœn. Acad. v. 3. 230. t. 4.—“Leaves rather hairy, undulated; the sinus dilated at the base; stalks flat above, sharp at the edges.”—Native of China and Siberia.—*Root* composed of numerous thick fibres, running further into the ground, and of a deeper yellow than the foregoing. *Stem* upright, three or four feet in height, of a pale brownish colour. *Leaves* somewhat tapering, much waved at their edges, strongly veined beneath. *Flowers* white, in loose panicles or bunches. *Seeds* of a rusty brown.

3. *R. palmatum*. Official or Turkey Rhubarb. Linn. Sp. Pl. 531. Mill. Illustr. t. 30. Woodv. Med. Bot. 127. t. 46.—“Leaves palmate, pointed, roughish; the sinus dilated at the base; stalks obsoletely furrowed above, rounded at the edge.”—Native of China and Tartary.—*Root* perennial, thick, oval, sending forth numerous tapering branches, externally brown, internally yellow. *Stem* erect, six or eight feet high, round, hollow, jointed, sheathed, slightly furrowed, branched towards the top. *Radical-leaves* numerous, large, rough, roundish, deeply lobed; *stem-leaves* one at each joint, from a membranous sheath, smaller upwards. *Flowers* of a greenish-white colour, surrounding the branches in numerous clusters, forming a kind of spike.

The roots of this and the last species constitute the drugs which in our shops are known by the names of Chinese and Turkey Rhubarb, although other species of *Rheum*, especially *compactum*, possess like medicinal properties, and their roots are of course sometimes substituted for the true ones. Professor Martyn and Dr. Woodville have taken great pains to illustrate this genus, so justly celebrated for its purgative qualities. Dr. Pulteney remarks, that if *R. undulatum* and *R. palmatum* are planted near each other, they produce a hybrid variety, more excellent in kind than the parent plants.

4. *R. compactum*. Thick-leaved Rhubarb. Linn. Sp. Pl. 531. Mill. Ic. v. 2. 145. t. 218.—Leaves somewhat lobed, very obtuse, lucid, sharply toothed, quite smooth.—Native of Tartary.—*Roots* large, much divided, yellow within. *Stems* five or six feet high, green, branched at the upper part. *Leaves* long, broad at the base, coriaceous and compact, rather waved, and having a sharp acid flavour. *Flowers* white, forming an erect panicle or spike. This is frequently substituted for the real rhubarb.

5. *R. tartaricum*. Tartarian Rhubarb. Linn. Suppl. 229. Willd. n. 5.—Leaves ovate, heart-shaped, undivided, flat, smooth, on roundish, angulated stalks. Panicle furrowed.—Native of Lesser Tartary. We know of neither specimen nor figure of this species. Linnæus described it from the Upsal garden as having large leaves, the radical ones procumbent, with dilated veins, on red stalks, which are convex beneath. *Inflorescence* scarcely higher than the leaves.

6. *R. Ribes*. Warty-leaved Rhubarb. Linn. Sp. Pl. 532. Desfont. in Ann. du Mus. v. 2. 261. t. 49. (La-

pathum orientale, aspero et verrucoso folio, Ribes Arabibus dictum; Dill. Elth. v. 1. 191. t. 158. f. 192.)—Leaves very obtuse, verrucose, with spinous veins beneath; stalks flat above, rounded at the margin.—Native of the Levant; on mount Libanus, and other mountainous parts of Syria.—*Root* thick and fleshy. *Stems* two feet high, hairy, green, tinged with purple towards the bottom. *Leaves* large, curled at the edges, veined, of a purplish-green colour, paler beneath, studded with warts. Linnæus, who had never seen the flower, referred this plant to *Rheum* from its habit.

7. *R. hybridum*. Bastard Rhubarb. Willd. n. 7. Murray in Comment. Gott. 1779, 7. t. 1.—Leaves smooth above, rather hairy beneath, slightly lobed, acute; the sinus narrowed at the base; stalks obscurely furrowed above, rounded at the margin.—Native of the north of Asia.—Very similar in habit and appearance to *R. palmatum*, and we are much disposed to consider it, with professor Murray, as a hybrid plant produced between that and some other species. The leaves of this are not so much nor so deeply cut as those of *palmatum*.

8. *R. leucorrhizum*. White-rooted Rhubarb. Willd. n. 8. Pallas Nov. Act. Petrop. 1792, 381.—Leaves transversely oval, depressed. Panicle divaricated when in seed. Two segments of the calyx many times larger than the rest.—Native of desert places, on the mountains of Siberia.—Adopted by Willdenow, on the authority of Pallas, who describes it thus. “*Radical-leaves* usually three, procumbent, four or five inches wide, three-nerved, much veined, smooth, coriaceous, lengthened out at the base; rough at the edges, with very minute, cartilaginous, acute crowded teeth. *Stalks* compressed, smooth, solid, succulent. *Flowering-stem* a span high, furrowed, paniced.”

RHEUM, in Gardening, contains plants of the herbaceous, perennial, luxuriant kind, of which the species chiefly cultivated are; the rhapontic or common rhubarb (*R. rhaponticum*); the palmated-leaved (*R. palmatum*); the compact thick-leaved rhubarb (*R. compactum*); the waved-leaved Chinese rhubarb (*R. undulatum*); the warty-leaved Persian rhubarb (*R. ribes*); and the Tartarian or heart-leaved rhubarb (*R. tartaricum*.)

It is stated, on the authority of several cultivators of the first species of this plant, by the editor of Miller’s Dictionary, that by proper attention in the growth and preparation of the root, it may be obtained here nearly in equal goodness to the foreign.

Method of Culture.—These plants are all increased by seeds, which should be sown in autumn soon after they are ripe, where the plants are designed to remain, as their roots being large and fleshy when they are removed, they do not recover it soon; nor do the roots of such removed plants ever grow so large and fair as those which remain where they were sown. When the plants appear in the spring the ground should be well hoed over, to cut up the weeds; and where they are too close, some should be cut up, leaving them at the first hoeing six or eight inches asunder; but at the second, they may be separated to a foot and a half distance, and more. When any weeds appear, the ground should be scuffled over with a Dutch hoe in dry weather; but after the plants cover the ground with their broad leaves, they keep down the weeds without any further trouble. The ground should be cleaned in autumn when the leaves decay, and in the spring, before the plants begin to put up their new leaves, be dug well between them. In the second year, many of the strongest plants will produce flowers and seeds, and in the third year most of them. It is advised, that the seeds be carefully gathered when ripe, and not

not permitted to scatter, lest they grow and injure the old plants.

The roots continue many years without decaying, and it is said that the old roots of the true rhubarb are much preferable to the young ones. The roots may be generally taken up after four years, but if they remain longer, it is so much the better.

These plants delight in a rich soil, which is not too dry nor over moist : and where there is a depth in such land for their roots to run down, they attain a great size, both in the leaves and roots.

Some cultivators think that the sowing is best performed in the later spring months ; but in this way, as the seeds are slow in vegetating, there is much time lost. And a hot-bed has been sometimes employed, though it is not much advised.

The rhubarb plants may be also increased from offsets, separating some of the eyes or buds which shoot out on the upper parts of the root, together with a small part of the root itself, having some of the fibres to it. These offsets may be taken from roots of three or four years old, without any injury to the plant. By this method a year is saved, and the plants are not in such danger of being devoured by vermin as those from seed, nor so uncertain in growing ; they are not so tender, and only require keeping clear of weeds. There is no difference in the size of the roots thus raised, from those which grow from seeds. This method was practised by Mr. Hays, and in Mr. Hayward's practice several offsets were slipped from the heads of large plants in the spring, and set with a dibble about a foot apart. Four years after, he took up the roots, and found them very large, and of excellent quality. On further experience, when he took up his roots, either in spring or autumn, he divided the head into many parts ; these he planted directly, at two feet distance, if intended for future removal ; but if to remain for a crop, at four feet and a half.

And in the culture of this root for medicinal uses, the nature of the aspect is said not to be very material, provided it be not shaded too much on the south or west. The indispensable points are the depth and good quality of the soil, which should be light, loamy, and rich, but not too much so, lest the roots be too fibrous : it can scarcely be too dry, for more evil is to be expected from a superabundancy of moisture than from any actual want of it. If, with these advantages, the plantation can be placed on a gentle declivity, such a situation may be said to be the most desirable. Where a plantation does not possess the natural advantage of being on a declivity, narrower beds and deepened trenches are among the artificial means that should be adopted ; but most situations will require some care to prevent the ill effects of water remaining on the crowns of the plants : therefore, when the seed-stalks are cut off, which ought always to be done immediately upon the withering of the radical leaves, they should be covered with mould, in form of a hillock. This process will answer two good purposes ; that of throwing off the rain, and keeping open the trenches by taking the earth from them. And it is observed, that the injuries to which the young plants are most liable, are from slugs and other vermin, from inattention to the season and manner of planting, and from too great an exposure to frost. Little damage is to be feared from heat ; and, in general, they are hardy and easy of cultivation when arrived beyond a certain term. It is advised to take great care of the nursery bed, as the pains bestowed by constant waterings, and protecting the young plants from the ravages of insects, will amply repay the planter. Roots that thrive well here, will in three years arrive at an equal size with

others, that have not succeeded so well at the end of five. When a plantation is to be formed, or a vacancy filled up, select the finest and most thrifty plants. No plant will come to any thing when it has lost its principal bud.

It is also observed, that there is a difference of opinion in respect to the age at which the roots ought to be taken up for use ; but it is probably best done from four to eight years. They are the best when taken up in autumn, in a dry time, and should be immediately dried and prepared by cutting into pieces and cleaning, hanging them on proper strings in a dry airy place.

And some plants of each of the sorts may also be introduced in the dry borders and clumps, for the ornamental effect of the leaves and flowers.

RHEUM, in *Medicine*, *ῥευμα*, *defluſion*, a term which was in common use in the vocabulary of the humoral pathologists, to denote the fluid discharged from a part, as of mucus in coryza and catarrh, and also a supposed accumulation or congeltion of fluid in a part. In their doctrine, every inflammation and tumour was ascribed to a defluſion of some humour in the part affected ; but modern observation has taught us, that the accumulation of fluid, in these cases, is generally the effect, and not the cause, of the disease ; being the consequence of inflammatory action of the vessels, which produces an increased discharge and an altered condition of their secreted fluids. Although the term and the doctrine are both exploded, they have left a popular appellation attached to a disease, which is universally called *rheumatism*.

RHEUMATISM, from the preceding word, a painful disease usually affecting the joints, and sometimes the muscles. The appellation seems to have been first limited to this disorder by a celebrated French writer, Baillou, or, as he calls himself in Latin, Ballonius ; and has since been adopted both by the erudite and the vulgar.

Rheumatism assumes two or three forms, remarkably different from each other, independently of the varieties which difference of seat occasions ; a difference, indeed, which is rather nominal than real. Of the latter distinctions, we have *lumbago*, when the disease is seated in the loins (*lumbi*) ; *ischiatic*, or *sciatica*, when it occurs in the hip ; and *pleurodyne*, when it attacks the sides, which are lined with the membrane called *pleura*, &c. The more remarkable species of the disease, however, to which we have alluded, are the *acute* and *chronic* forms which it exhibits. There is also a third form, partaking more of the acute than of the chronic species, which has been called, with some impropriety, *rheumatic gout*, or *arthritis rheumatica*. It will be necessary to speak of the acute and chronic rheumatism, as well as of the rheumatic gout, separately ; since the treatment, which they respectively require, is considerably different.

RHEUMATISM, *Acute*, otherwise called *rheumatic fever*, begins, like most other febrile diseases, with fits of chilliness, which are succeeded by increased heat, frequent pulse, thirst, loss of appetite, and prostration of strength. Not unfrequently, however, the peculiar symptoms appear before any febrile symptom is observed ; namely, pain and inflammation in the joints. The pain sometimes affects the joints alone, but often it affects also the muscular parts, shooting along the course of the muscles from one joint to another ; and it is always increased by the action of the muscles, that is, by any attempt to move the joints that are diseased. Its usual seat is in the larger joints, such as the hips, knees, shoulders, and elbows : the ankles and wrists are also frequently attacked ; but the smaller joints, such as those of the toes and fingers, suffer considerably less. Two, three, or more of these joints are commonly affected at the same time :

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time; but the pain is constantly shifting its place, leaving some joint and going to another, and frequently returning again to each of them several times during the course of the disease; and in this manner the disease is often protracted for a considerable length of time. Soon after, and sometimes at the same moment with the commencement of the pain, the joint seized becomes swelled and somewhat red; and this swelling is extremely painful to the touch. The pain is sometimes relieved by the occurrence of swelling, but not always; neither is the joint thus rendered more secure from a return of the attack. The patient, thus unable to move the joints affected, which are irritated and acutely pained by external contact, sometimes even by the weight of the bed-clothes, and in a state of severe internal pain, unable to find any position of ease, lies sleepless and restless for several days and nights together. The fever accompanying the disease is most considerable during the night, at which time the pains also are most violent. The pulse is commonly from ninety to a hundred in a minute, and occasionally more frequent; often full, and sometimes hard and sharp, but most frequently soft. The heat of the skin is considerable, and the disease is commonly attended with sweating, even from an early period, which is often profuse and constant, but never either relieves the pains permanently, or proves a crisis to the fever. The urine, in acute rheumatism, is remarkably high-coloured from the beginning, and afterwards deposits most copiously a brownish-red sediment, like brick-dust. This sediment, however, is probably the result rather of the profuse sweating, than of any peculiarity belonging to the disease; since it is commonly seen after a dose of sudorific medicine, or any other variety of perspiration. Like the sweating, it does not occasion or betoken any favourable change in the fever. When blood is drawn in this disease, it always exhibits, and generally in a high degree, the buffy coat, as it is called, or a coriaceous covering of coagulable lymph, on its surface.

With the symptoms above detailed, the rheumatic fever often continues for several weeks: it seldom, however, proves fatal, and perhaps never, while the joints alone are the seat of the disease; the fever, indeed, usually becomes less violent after two or three weeks, and the pains less severe, and less disposed to change their place. But occasionally the inflammation of the joints has disappeared, and some vital organ, as the brain, lungs, or stomach, has been seized with inflammation, by which the patient has been carried off; or these organs have become simultaneously affected, and the same fatal event has ensued. We have had occasion to witness two instances of this kind, out of several hundreds of cases, in which a transition of the disease from the joints to the lungs took place, or, at least, in which, on the speedy cessation of rheumatism in the joints, a violent inflammation of the lungs supervened, and terminated fatally. We have also seen such a metastasis to the lungs, which was removed by vigorous treatment. The venerable Dr. Haygarth, however, has given a more unfavourable statement of this matter from his experience; for "out of 170 cases," (speaking of acute rheumatism,) he says, "I have found twelve which had a fatal termination, either by a transition of the inflammation to the brain, lungs, kidneys, stomach, or some other vital part, or as being found in combination with other diseases." (See Clinical Hist. of Acute Rheumatism, p. 61.) Dr. Cullen has not mentioned any such result of the disease. From the observations of our contemporaries, it has been found that the heart is peculiarly liable to be affected by a metastasis of rheumatic inflammation, or to be attacked with a slow disease, by which its bulk becomes increased, and its functions disturbed, after

the cessation of acute rheumatism. This fact was first mentioned by Dr. Baillie, on the authority of the late Dr. Pitcairn, and has since been more fully established by the records of several cases. See especially a paper by Mr. Ferjeant-surgeon Dundas, in the first volume of the Medico-Chirurgical Transactions; also Dr. Baillie's Morbid Anatomy.

It has been remarked by Dr. Cullen, as indicative of the peculiar nature of rheumatic inflammation, that "the acute rheumatism, though it has so much of the nature of the other phlegmasiæ, differs from all those hitherto mentioned in this, that it is not apt to terminate in suppuration." This almost never happens in rheumatism; but the disease sometimes produces effusions of a *transparent gelatinous fluid* into the sheaths of the tendons. If we may be allowed to suppose that such effusions are frequent, it must also happen that the effused fluid is commonly re-absorbed; for it has seldom happened, and never indeed to my observation, that considerable or permanent tumours have been produced, or such as required to be opened, and to have the contained fluid evacuated. Such tumours, however, have occurred to others, and the opening made in them has produced ulcers difficult to heal." (See Cullen, First Lines, par. 448.) The non-occurrence of suppuration in these violent rheumatic inflammations is of itself a striking characteristic of the disease; and the circumstance, that it is not productive, on the other hand, of what are called *chalk-stones*, or of that cretaceous-like secretion which is the result of the inflammation of gout, distinguishes it from the latter malady. In addition to this circumstance, however, there are other points of distinction between the *gouty* and *rheumatic* inflammation; namely, that the latter usually attacks the large joints; that it is not preceded by symptoms of indigestion; that it does not recur in regular paroxysms; and that it attacks younger people, and those not liable to gout from their modes of life; and, as we shall see immediately, is usually the effect of a specific cause, cold.

Causes of Acute Rheumatism.—The circumstances which constitute a predisposition to the attacks of acute rheumatism are various. Persons of an irritable, plethoric, or sanguineous habit, are most liable to be affected, when exposed to the action of the exciting causes; and a certain period of life, in which there is a considerable vigour in the sanguiferous system, also predisposes to it. It affects, indeed, persons of all ages, from five to above sixty years; but is much the most frequent between the time of puberty and the thirtieth year. Dr. Haygarth considers it as most common between fifteen and twenty. Some difference has been supposed to exist with respect to *sex*; since it is certain that males are much more subject to the disease, in this country, than females; Dr. Haygarth says, in the proportion of nearly four to three. But it is probable, as the same writer suggests, that this arises from the more constant exposure of men to cold and rain, by the nature of their occupations, than women; whence, he was informed, that, in Holland, the rheumatism is seldom found in women, though the air is very humid, because they are more domesticated than in this country, and their dress is warmer. Preceding attacks of the disease seem to afford a strong predisposition to future recurrences of it.

When these predispositions exist, the acute rheumatism is readily excited by the sudden application of cold or damp, when the body has been already much heated, and is perspiring after fatigue; or when one part of the body is exposed to cold, while the other parts are kept warm; or, lastly, by any long continued application of cold and moisture, under any circumstances, as by wearing wet or damp

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clothes. Whence the disease is almost exclusively observed in cold and changeable climates; and is most frequent in the most variable seasons, as in the spring and autumn, very seldom occurring during the steady heat of summer.

Cure of Acute Rheumatism.—With respect to the treatment, which is most successful in the removal of this distressing and painful malady, considerable difference of opinion, and some fluctuations of opinion, have taken place among professional men. The acute pain, the great heat, the quickness and fulness of the pulse, and the buffy or inflammatory appearance of the blood, when drawn, have led the majority to look upon it as a highly inflammatory disease, and to be cured almost exclusively (like the other organic inflammations) by copious *blood-letting*. Boerhaave maintained this doctrine; and Cullen followed him to the full extent. "The blood ought to be drawn in *large quantity*," says the latter, "and the bleeding is to be repeated in proportion to the frequency, fulness, and hardness of the pulse, and to the violence of the pain. For the most part, *large and repeated bleedings*, during the first days of the disease, seem to be necessary, and accordingly have been very much employed; but to this some bounds are to be set: for very profuse bleedings occasion a slow recovery, and, if not absolutely effectual, are ready to produce a chronic rheumatism." (First Lines, parag. 463. See Boerhaave, app. 1493.) The Cullenian doctrine is, we believe, even now taught in the school of Edinburgh, with scarcely any of the cautionary bounds mentioned by that sagacious practitioner. Sir John Pringle trusted much to the same practice. Sydenham began his career by ordering four bleedings for the cure of rheumatism; but he appears to have gradually declined in his attachment to that practice, and says, that he found it better to purge after the second bleeding. And again, in the last piece which he ever wrote, he says, "If we obstinately persist in these evacuations, till the symptoms entirely go off, the disease will often terminate fatally." (Sched. Monitor.) He also says, in his *Processus Integri*, which he composed for the use of his son, that in young persons, who live temperately, "the rheumatism may be as successfully cured by a very cooling and moderately nourishing diet, as by repeated bleedings, which they cannot so well bear." Van Swieten, who has traced out this progress of Sydenham's experience, admits that he has cured many cases of acute rheumatism without bleeding, if they were mild in the beginning.

Now this has been the progress of the general experience in our own times; and at present, few English physicians deem blood-letting the leading remedy for acute rheumatism. On the contrary, the most experienced have fully decided, that, in the great majority of cases, evacuation is entirely unnecessary; and that, if it is frequently repeated, it does a material injury, by sinking the patient into a long and tedious chronic disease, as Dr. Cullen stated, from which there is sometimes no recovery; and always occasions a lingering convalescence. Perhaps the only cases in which it is requisite are in persons of highly vigorous and inflammatory habits, in whom a single bleeding may diminish that diathesis; and in those cases in which metastasis threatens, or actually takes place. Where this translation has indeed already occurred to any vital organ, as the lungs or brain, then the most vigorous venesection must be resorted to, as for the most dangerous forms of pleurisy or phrenitis.

But, we repeat it, experience has legitimately proved, that blood-letting may be superseded altogether, in a great majority of cases of acute rheumatism, by other remedies. These other remedies, to which different practitioners have resorted, have been chiefly *purgatives*, *sudorifics*, *opiates*, and

the Peruvian *bark*, of each of which it will be necessary to take some notice; for they are all useful under certain conditions of the patient and the disease, and constitute the principal means of cure.

Purgatives, as they contribute, if properly selected, to reduce every species of febrile excitement, though they are alone incapable of effectually relieving this disease, are yet essentially beneficial as a part of the plan of cure. The saline purgatives, such as the sulphate of magnesia, are the best adapted to relieve the bowels and the system at large; or they may be assisted by moderate doses of calomel, which perhaps more effectually empties the upper bowels. They become also more particularly necessary, when the narcotic medicines, to be mentioned presently, are administered, with a view to obviate the constipation which the latter produce. But no practitioner would confide in cathartics alone for the cure of acute rheumatism.

With respect to *sudorifics*, there is a more general tendency to trust the cure to them; partly because the pains are often said to be easier, while perspiration is present; and partly with the view of assisting the apparent efforts of the constitution. It may be remarked, however, that although the most profuse sweats very frequently break out spontaneously, they seldom afford any essential relief; and they will continue day after day, without any apparent influence upon the disease. Accordingly, much direct benefit could not in reality be expected to arise from augmenting a discharge, already very profuse, and of considerable duration; and, in truth, we believe mere sweating is productive of no benefit. But the medicines given as sudorifics, especially antimonials and Dover's powder, operate beneficially perhaps by their other qualities. Thus the antimonials, and the ipecacuanha, and salt of this powder, are kindly and gentle laxatives, and thus produce an antiphlogistic effect as evacuants; but the principal operation of the powder of Dr. Dover is probably the result of the opium which it contains.

For *opiates* alone, that is, uncombined with antimony or ipecacuanha, have been relied upon by some practitioners, and with the most marked success. As opium, and other substances, possessing a similar narcotic power, have been known from ancient times to be highly stimulant, that is, to cause an increased activity and vigour in the circulation and nervous system, and therefore to be highly injurious in active inflammations; so all those physicians, who advocated venesection, shunned the use of opiates religiously; and even those, who found by experience that blood-letting was not required, questioned nevertheless the impunity with which opiates might be administered. Experience, however, has now fully determined this point also; that opium may be administered largely, not only with safety, but with most essential benefit, in the most severe cases of acute rheumatism. As far as our own observation has gone, indeed, (and we have had occasion to treat some hundreds of persons affected with this malady,) the combination of repeated doses of opium, with a daily saline laxative, with copious thin diluent drinks, and a light diet, in the beginning of the disease, constitutes the most successful management of the disease; a practice which, it is but justice to say, was introduced into St. George's hospital, many years ago, by the present senior physician, Dr. George Pearson. From half a grain to a grain, or more, of solid opium may be given three times a day, in the combination just mentioned, without affecting the head or the stomach, with great, speedy, and often permanent relief to the disease, and without leaving the tendency to a slow convalescence, or a chronic malady, like the violent depletory system.

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In favour of the treatment of this apparently acute inflammation by the still more opposite means of a powerful tonic, the *cinchona*, or *Peruvian bark*, the recorded testimony is still more considerable. Dr. Cullen affirmed of the bark, that he had "seldom found it useful, and in some cases hurtful," when employed before the phlogistic diathesis was abated, and something like remissions occurred in the fever. Other practitioners, however, have considered these previous changes unnecessary, except in a very partial degree, and contend, that the early use of the bark is the most efficacious mode of curing acute rheumatism. Dr. Haygarth is one of the most strenuous advocates for this practice; indeed, a conviction of its advantages is the avowed motive for the publication of his "Clinical History" of the disease, to which we have already referred. He was led to the adoption of the remedy early, on the recommendation of the celebrated Dr. Fothergill, who received it from sir Edward Hulse. Dr. Haygarth has recorded eighty-four cases in which the *cinchona* was administered, in general, very early in the disease, after a moderate evacuation of the stomach and bowels, principally by means of antimonial medicines. On some occasions, however, Dr. Haygarth also preceded the use of this remedy by a bleeding, where the symptoms were very violent.

On the whole, the inference which we are disposed to draw from these authorities, aided by personal observation, is, that the most successful practice consists in a free purgative evacuation, and an occasional bleeding in particular habits, in the very onset of the disease, followed immediately by the free use of opiates, with copious drinks and saline laxatives, and this succeeded, without delay, when the pains and tumours have somewhat remitted, by a resort to the decoction of *cinchona*, or some gentle tonic.

All external applications to the parts which are swelled and painful, in acute rheumatism, are of little or no service. The warm bath and fomentations, especially in the beginning of the disease, rather aggravate than relieve the pains. Blistering, or the minor degree of superficial inflammation produced by rubefacients, if they diminish the pain in one part, generally only occasion it to shift to another, and do little towards the cure of the general affection. The same observation is applicable to refrigerant remedies, such as to washing with cold water or other lotions the tumid joints; the disease but changes its situation, without any tendency to cease altogether; and the change of situation, though it is commonly from joint to joint, may nevertheless occasionally take place from the joints to a more important organ.

RHEUMATISM, Chronic. In many instances, this form of rheumatism is the direct consequence of an attack of the acute form of the disease. The febrile symptoms, the swelling, and particularly the redness of the joints, have disappeared, and the general functions have resumed their healthy condition; but still certain joints continue to be affected with pains and stiffness, which are particularly felt on motion, and are often accompanied by a spontaneous coldness, and a torpor, sometimes almost amounting to paralytic. These affections are much influenced by the changes in the temperature and humidity of the atmosphere, and are distinctly aggravated by external cold, and relieved by external warmth. The parts affected are not easily made to perspire, and when the other parts of the body are brought into a state of free and warm perspiration, that on the pained joints is only cold and clammy. The pains are also, like those of acute rheumatism, most severe in the night.

This chronic affection of the joints, however, is very often altogether independent of any previous inflammation and swelling, and occurs in many persons who have never been subject to an attack of acute rheumatism. It occurs, indeed, very frequently in persons somewhat advanced in life, and beyond the period when the acute form of the malady is usually seen. In these cases it is commonly ascribed to the action of cold; very often to partial exposures of the particular parts of the body in which it takes its seat; and it is apt to be produced again and again in those parts which have once suffered from exposure of other parts of the body to cold. Thus, getting the feet wet will induce an attack of lumbago, sciatica, or a crick in the neck, according to the predisposition induced in these respective regions by former attacks. Many cases of chronic rheumatism are ascribed, however, to violent strains of the muscles of particular parts, occurring on sudden and somewhat violent exertions, and even to fatigue from long continued exertions of particular muscles.

As the exact nature of the affection called chronic rheumatism is not very clearly understood, so the method of cure, which is usually pursued, is somewhat empirical; *i. e.* the mere result of the observation of the effects of different medicines which have been tried. Dr. Cullen, indeed, attempted to explain the nature of the disease, by saying, that it consisted in "an atony both of the blood-vessels and of the muscular fibres of the part affected, together with a degree of rigidity and contraction in the latter, such as frequently attend them in a state of atony;" and therefore concluded, that such remedies were required, as were suited "to restore the activity and vigour of the vital principle in the part." The explanation of Dr. Bardley, however, though not very different, is perhaps more consonant to the general opinion upon this subject. He considers the principle of cure as simple and uniform; namely, that "it consists in removing passive inflammation, and restoring the debilitated vessels and muscular fibres to their due tone and action." (See Dr. Bardley's Medical Reports, p. 4.) The remedies by which these objects are attained, may be included under two heads, internal and external.

The *internal* remedies which have been recommended for the cure of chronic rheumatism, though very numerous, have, on the whole, been found to possess a very uncertain power over the symptoms of that disease; and many which have been highly extolled, have been given up in total disappointment. Nevertheless, in many instances, these remedies are essentially beneficial, sometimes curing the disease alone, and generally aiding the operation of external applications. They may be described under the denomination of sudorifics and stimulants, or stimulant-diaphoretics, to which may be added mercurials, and some individual articles of peculiar operation.

These sudorifics appear to possess very little remedial power over the chronic rheumatism, and the less in proportion as the disease partakes less of the swelling and inflammation of the acute species, or as it is of longer standing. In the majority of cases they are even worse than useless. Dr. Bardley says, "in short, I can speak decidedly of the injurious effects of sudorifics, when pushed to any great extent, in every instance of severe local affection of the joints; and also in most other cases, where the disease has been long continued, and the patient's constitution much debilitated. In chronic lumbago and sciatica, I have never experienced any lasting benefit to result from this mode of practice." Dr. Bardley, indeed, speaks very lightly of the effects of all the internal remedies, not only of this, but of the stimulant

lant clafs. He admits that fmall dofes of antimonial powder, combined with calomel and opium, are certainly ufeful in allaying pain and irritation; but he believes that their efficacy confifts rather in palliating fymptoms, than in curing the difeafe, when it is confiderable in degree and obftinate in kind. "The fame obfervation," he fays, "will nearly apply to the ufe of ftimulant remedies, fuch as refin of guaiacum, the clafs of terebinthines, and of effential oils. In the moft aggravated inflances of general chronic rheumatifm, where great torpor and debility prevailed, guaiacum, in fuch large dofes as the ftomach and bowels would bear, was found to be a powerful auxiliary; and certainly the moft generally efficacious of all the internal remedies that were employed. But I have feen no inflance of its complete fuccefs, when unaided by topical applications, in any fpecies of the difeafe where much local injury of the joints had taken place. It acted moft beneficially when exhibited in fubftance, well triturated with mucilage; to which was occasionally added gum kino, or tincture of opium, to prevent its effects on the bowels. In many obftinate cafes, the ammoniated tincture of guaiacum, incorporated with mucilage, and joined to a ftiong decoction of bark, proved of great fervice, where the conftitution was broken down by the violence and length of the difeafe. There were but few protracted cafes in which the Peruvian bark was not preferred with advantage as a tonic, efpecially at the clofe of the difeafe. It was, however, never adminiftered with any other defign than as an auxiliary." (Loc. cit. p. 16.) We have quoted this paragraph, as containing the refult of the deductions from a large number of cafes, treated in a public Hofpital, by a careful and intelligent obferver; and, therefore, as affording a probable approximation to the general fact of the operation of thefe medicines. The fame obfervations, we believe, are applicable to fome of the other remedies, of a ftimulant and diaphoretic quality, which are often reported to; fuch as the preparations of ammonia, infufion of horfe-radish, decoctions of mezereon and rhododendron, mulard-feed, and all the terebinthinate fubftances and hot gums. The oil of turpentine itfelf has been much employed, and perhaps conftitutes a part of the celebrated noftrum called the effence of muftard; but our experience of its effects accords with that of Dr. Bardfley, who fays, that, in every form, turpentine was found to be an ungrateful medicine to the ftomach: often impairing the appetite, and not producing, when even duly perfifted in, effects as falutary as the guaiacum and other remedies already mentioned. Nevertheless, we muft remark, that in different individual inflances, one of thefe remedies will fometimes fucceed when the others have failed, and that therefore none of them fhould be excluded from the catalogue of ufeful expedients.

Some other fubftances have been employed, with occasional fuccefs, in the cure of different cafes of chronic rheumatifm, which do not appear to poffefs any quality in common, and the operation of which, therefore, cannot be fatisfactorily explained. Among thefe we may mention *fulphur*, which has long poffeffed a fort of popular reputation for the cure of lumbago, and fome other varieties of the difeafe. Taken nightly in a confiderable dofe, fo as to act gently upon the bowels, it has fucceeded, in fome inflances, in affording a very fpeedy and marked alleviation of the fymptoms; but, on the other hand, it has very often failed to produce any effect whatever; and under what circumftances thefe refpective variations in its operation occur, we have not been able to afcertain. Another remedy has enjoyed a very high reputation in fome parts of the country, efpecially in Lancashire; we mean the *cod-liver oil*, or *ling-liver oil*; for it appears that the oil obtained from the liver of either of thefe fish is equally effica-

cious. Of this remedy many testimonials might be adduced in proof of its occasional efficacy in the moft unyielding cafes of chronic rheumatifm. From long and repeated experience, Dr. Bardfley affirms that he is enabled to fpeak of it as a medicine of confiderable but limited powers: in fome inflances, where every other means had proved unfuccefsful, it has operated in a manner fo decidedly beneficial, as to excite aftonifhment; but, on the other hand, he found it to fail often in the more mild and common rheumatic affections. He believes it to be moft beneficial in the chronic rheumatifm of perfons advanced in age, which is accompanied with extreme rigidity of the mufcles, and inflexibility of the joints, in confequence of much expofure to cold and moifture, with hard fare and much fatigue. It was commonly taken in warm table-beer by the hofpital patients, in dofes of half an ounce, or from that to an ounce and a half twice or thrice a day, according to its effects, or to its agreement with the patient's ftomach. Its operation is various, fometimes upon the kidneys, and fometimes upon the bowels; and occasionally it produced an eruption on the fkin: but thefe effects occurred only at the firft taking; for after a fhort continuance, it ceafed to produce any fenfible operation. When it produced relief, this was obvious by the end of a fortnight, and continued slowly to increafe; and in thefe cafes the patients generally began to increafe at the fame time in bulk and fatnefs. Neverthelefs, the objections to the general ufe of this medicine, from its extremely naufeous fmell and tafte, which render it abfolutely intolerable to many ftomachs, however difguifed, and the admiffion of Dr. Bardfley, that it is only to be deemed an auxiliary, and in many refpects inferior to guaiacum, do not lead us to expect that it will ever be generally adopted, notwithstanding its reputation and extenfive employment in the Manchester Infirmary, where the annual confumption has been nearly fixty gallons for about forty years. Bardfley, loc. cit. p. 22.

As another expedient for the cure of chronic rheumatifm, the *arsenical folution* of Dr. Fowler has been recommended by Mr. Jenkinson and others. For our own part we have not been fo fortunate as to difcover any remedial properties of this fort in that folution; but from the evidence of two or three cafes adduced by Dr. Bardfley, it appears probable that this medicine is capable of producing very beneficial effects in protracted chronic rheumatifm, where the vital powers are much diminiſhed, and the ends of the bones, periosteum, capſules, or ligaments of the joints, are likewife partially affected; though in the milder cafes, where the mufcles and their inveſting membranes are the feat of the complaint, it appears to be ufelefs.

External Remedies.—Among the remedies which are uſually employed externally for the cure of chronic rheumatifm, and which, when aided by the adminiftration of medicines internally, have been found moft fuccefsful, are principally the *warm and vapour bath*, and various *epiſpaſtic, rubefacient* and *ftimulant* plafters, liniments, and embrocations, employed with or without confiderable *friction*.

The *warm or tepid bath*, from the temperature of 85° to 95° of Fahrenheit's thermometer, is very uſeful in foothering pain, and in relaxing the ftiffened joints and rigid fibres of the mufcles, efpecially in elderly patients, whoſe ſtrength is confiderably reduced by the length and violence of the diforder. But the ufe of a warmer bath, fo as to excite ſweating, is apt to induce both local and general debility in protracted cafes, and affords but a temporary relief to the difeafe. But on the whole, the application of the *vapour* of hot water to the ſurface is a more efficacious remedy. Dr. Bardfley fays, "whenever the joints were found fo rigid as to be nearly immoveable, and the pains upon motion ex-

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quifitely fevere, or when the muscles had become contracted and almost paralytic,—and indeed in every protracted case of the disease of the hip-joint, *lumbago*, or *sciatica*, the vapour of hot water, locally and properly applied, afforded (especially in conjunction with other topical applications) a safe and often successful remedy.” It may be necessary to describe the mode of employing this vapour. It consists in conveying the steam, from a boiler, through tubes of different diameter, so as to apply it to the different parts of the body. In all obstinate affections of the joints, the author just quoted observes, a pipe of nearly half an inch in diameter is to be preferred, and a quarter of an hour is the shortest period for its application. In the commencement, however, it is better, as a general rule, to use a pipe of smaller size, and only to permit the vapour to strike upon the affected part at some distance from its aperture; for by these means an inconvenience will be avoided, which has sometimes prevented the steady application of the remedy; namely, a considerable irritation of the skin from an excess of heat. By degrees the parts become able to bear a large column of vapour, at a very small distance from the extremity of the pipe; and thus the remedy will be most likely to produce its full effect. This effect, however, is generally only to be deemed auxiliary, at least in obstinate cases; for it will seldom alone accomplish the cure.

Among the epispastic applications, *blistering* is commonly resorted to, and often with considerable benefit, especially when the pains appear to be seated only in the fascia and superficial fibres of the muscles. A repetition of blisters is preferable on the whole, both as productive of less distress to the patient, and more benefit to the disease, to the practice of keeping the blister open by a stimulating ointment. Some authors have recommended *issues* in preference to blisters, where they could be applied without inconvenience. The excitement of an external inflammation, by the application of the ointment of *emetic tartar*, has been also employed instead of blistering; and in some cases its effects have been highly beneficial.

Rubefacients, or those substances which stimulate the cutaneous vessels, and excite a redness of the surface by causing them to be distended with blood, have been found by the experience of all ages to be capable of removing slight instances of chronic rheumatism, and of alleviating the more severe, especially when their operation was aided by *friction*, and by warm or stimulant plasters. Where the pains are local and permanent, that is, not liable to shift about from joint to joint, great advantages result from stimulating the skin with an active liniment, and supporting the excitement by means of a warm plaster. The liniments may be composed of any stimulant, oleaginous, spirituous, or saponaceous liquids: as the common liniment of ammonia and oil, the soap liniment, with camphor, ammonia, tincture of cantharides, or turpentine; and the plasters may be composed of the gum resins, especially ammoniacum, with the acetic acid, or vinegar of squills, turpentine, plaster of cantharides, &c. Dr. Ferriar's formula, which is borrowed from Dr. Home, and consisted of two drachms of camphor, with an ounce of basilicon, and half an ounce of black soap, is said by him to have been very efficacious in the relief of *lumbago*. These liniments should be diligently rubbed upon the parts affected, after the skin has been warmed and irritated by the friction of hot, dry, and coarse cloths, or the application of the flesh-brush; or, especially in *sciatica* and *lumbago*, during the exposure of the part to the vapour-pipe. By these methods the stimulating effects of the liniments are much increased, the pain is more effectually relieved, and the cure much accelerated; especially

when a warm plaster is added to keep up these effects. (See Bardley, loc. cit; and Ferriar's Med. Hist. and Reflections, vol. i. p. 186.) The liniment originally employed by Dr. Home was spread upon leather, and applied over the diseased part; he speaks, not only from his own experience, but from that of others who had adopted it, of the efficacy of the prescription. (See Medical Facts and Experiments, part i. sect. 4; and again in his Clinical Experiments and Histories, sect. 14.) His formula is perhaps more active than that of Dr. Ferriar, containing cumin seed and ammonia in addition to the camphor, oil of turpentine, and common black soap. But the dispensaries abound with formulas for the composition of stimulating liniments and plasters of similar powers.

Among other stimulants which have been employed for the cure of chronic rheumatism, especially in those cases which are obstinate and of long duration, or are accompanied by considerable torpor and rigidity, and a diminution of the vital heat, the influence of the *electric* and *galvanic* fluids has been resorted to; and many testimonies might be adduced in proof of the beneficial operations of both these agents. Dr. Bardley affirms, that the application of electricity by sparks and shocks, especially the former, was manifestly advantageous; at the same time he acknowledges, that it was chiefly in conjunction with the local application of vapour, and with tonics and anodynes, administered internally, that the most marked advantages were produced. For our own part, we have witnessed so little decided effect from the operation of electricity in any disease whatever, that, after a long and frequent use of that agent, we have given it up in despair. Where it produces any effect at all, it is probably by its operation upon the mind of the patient, upon the same principle as the *metallic tractors* occasionally alleviated pain, (see IMAGINATION, Influence of, on the Body,) and not from any specific operation upon the diseased muscle.

The operation of mere *friction* assiduously employed, either by means of flannel or rough cloths, of the flesh-brush, or simply of the hands, or that sort of rubbing or kneading of the body which is called *champoning*, have been often resorted to with considerable benefit, especially in the cases connected with a paralytic torpor and rigidity of the parts affected. Perhaps, indeed, it is the stimulus of the friction, to which much of the benefit of liniments and embrocations ought to be ascribed; but as the patient's faith is chiefly fixed upon *medicated* frictions, so it is generally necessary to prescribe them, in order to ensure his perseverance in the rubbing.

The preceding observations have been applied to rheumatism generally, with only occasional references to the particular forms under which it occurs, such as *lumbago*, *sciatica*, *pleurodynie*, rheumatic head-ache, &c. because the treatment is generally applicable to the different situations of the body in which the disease seats itself. The principal attention that is requisite to these varieties arises from the resemblance of the symptoms to those of some other diseases. Thus the *pleurodynie*, or rheumatism affecting the muscles of the chest, and the diaphragm, being accompanied with acute pain and difficult respiration, might be confounded with pleurisy, and erroneously treated: but in this rheumatic affection of the chest there is seldom any cough, and no fever, two symptoms which are necessarily present in the case of pleurisy. Again, the *lumbago* is apt to be mistaken for *neuralgia*, or pain in the kidneys, connected with inflammation in these organs, or with the presence of gravel in them or in the ureters: it may be distinguished, however, from the diseases of the kidneys, by the circumstances, that the pain does not follow the course of the ureters, but

fretches

stretches rather down the thighs to the toes; that it is chiefly severe on assuming the erect posture; that it is not accompanied by sickness or vomiting; and that the urine is not changed in quantity or quality. Dr. Home, and some others, have believed that the sciatica is seated in the great sciatic nerve, or in its sheath, and the lumbago in the lumbar nerves.

Of *Arthritis rheumatica*, or *rheumatic gout*. This term, though improper, and calculated to mislead us in our notions respecting the nature of the disease, is retained in consequence of the want of a more correct appellation. The disease, in fact, is not a compound of gout and rheumatism, but probably rheumatism resembling, in some respects, the gout in its appearances. It has been called, by an able teacher at a large hospital in Southwark, the *rheumatagra*, or *acute-chronic rheumatism*. In some cases, the disease is merely a partial degree of acute rheumatism, affecting only one or two of the smaller joints, as the wrist or even the knuckles, with swelling, redness, and acute pain. This is often called gout; but as it occurs under circumstances which differ materially from those under which gout appears, is not preceded by indigestion, and does not terminate in the formation of chalk-stones, it is obviously a different disease. In many cases, however, it is the consequence of acute rheumatism, in which the joints last occupied by that disease, especially the ankles and wrists, remain swelled, stiff, and painful, and sometimes œdematous, for many weeks. The pain, in these cases, is generally aggravated at night, or by external heat; but it is accompanied by very little or no feverishness.

The more acute cases require nearly the same treatment as is employed for the cure of acute rheumatism. But when they assume more of a chronic form, when the ligaments and membranes of the joints are the peculiar seat of the disease, or an enlargement of the extremities of the bones appears to have taken place, especially in young or vigorous subjects, the first attempts to relieve should be made by means of *local bleeding*, either by the application of leeches, or, what is perhaps preferable, by the operation of cupping and scarifying. These local evacuations should be repeated, if the pain and irritation are not materially relieved; and the good effects may be aided by the application of *blisters* over the affected joints. Dr. Bardley strongly recommends the opening of a drain from the parts by means of *issues*, made by caustic; and affirms that, in obstinate cases, which have resisted all other means, he has found the happiest effects from issues. The *tepid bath* will often aid the operation of these remedies, together with the use of mild diaphoretics, followed by tonic bitters, such as the Peruvian bark, chalybeates, the myrrh mixture with steel, and the occasional use of antimonials with calomel.

Nodosity of the Joints.—Before we conclude the subject of rheumatism, it seems necessary to notice a state of the joints which is generally deemed rheumatic. Dr. Haygarth, however, observes, that it is nearly allied to gout in its character, and in the persons whom it attacks. These *nodes*, which occur most commonly about the fingers, hands, and wrists, but occasionally also on the knees, ankles, feet, elbows, shoulders, and other joints, produce strange distortions of the parts, twirling the fingers, &c. in various directions, and rendering the joints almost immovable. They are not separate tumours, but feel as if they were an enlargement of the bones themselves. Dr. Haygarth, indeed, is of opinion, that the ends of the bones, the periosteum, and the capsules or ligaments which form the joints, are the seat of this disease; though he does not appear to have ever examined the matter anatomically. In bad inveterate cases, he believes

that the joints are not merely distorted, but dislocated. The swellings are generally painful, especially in the night, though not severely, and often sore to the touch. In a few patients, a crackling noise is perceived in the joints when moved, particularly in the neck. The skin is seldom, if ever, affected with inflammation. There is one distressful circumstance belonging to this disease, that it has no intermission, and but slight remissions: for during the remainder of the patient's life, the nodes gradually enlarge, impeding more and more the power of motion. The malady also spreads to other joints, without producing any alleviation in those which it had previously attacked. In one case, mentioned by Dr. Haygarth, the fingers, wrists, knees, ankles, elbows, shoulders, neck, and hips, were all affected with this disease at the same time, that is thirteen joints, exclusive of the numerous joints of the hands: if each individual joint of the hands had been taken into the account, they would have amounted to not less than forty. In this case, the malady had been rapidly advancing for ten years: yet, though these nodes, in their gradual progress, sadly embitter the comforts, they do not shorten the duration of life: for Dr. Haygarth's first patient lived to the age of ninety-three. From the experience of this veteran physician it appears, that women are much more frequently the subject of nodosity at the joints than men, and that it commonly first begins to shew itself about the period of the cessation of the menses.

Various remedies have been recommended for the relief of these nodes; but they have not been found in general to be possessed of much efficacy. On the whole, the warm bath, a stream of warm water, such as the Bath pumping, or a warm *douche* on the nodes, together with the repeated application of leeches, appear to be productive of the most decided benefit in this disease; and the use of the leeches appears to constitute a very important part of that practice. In bad cases, from four to ten should be applied to the affected joints once or twice a week. The temperature of the pumping and *douching* should be varied, and that which appears, from the patient's report, to agree the best, and to be productive of the most decided effect in alleviating the pain and swelling, and in improving the power of motion in the joints, should be adopted. This will be found to vary, in different persons, from 81 to 113 degrees of Fahrenheit's thermometer.

Some authors have conceived that, together with these external remedies, the use of soda, or the vegetable alkali, internally, has been attended with considerable benefit. And Dr. Bardley relates a case, in which the continued use of mercury, so as to excite a moderate ptyalism, was apparently remedial. See Haygarth's *Clinical History of Diseases*, pt. ii.; and Bardley's *Reports*.

RHEXIA, in *Botany*, derived from *ῥήξις*, a rupture, or fracture, is the synonym in Pliny of a plant, reputed to be endowed with numerous virtues, and, amongst others, with the powers of curing ruptures, or similar complaints. His description leaves us in no doubt as to his plant; so far, at least, as its being of the Alkanet tribe, a species of *Anchusa*, or perhaps of *Echium*. Why Gronovius and Linnæus chose this name for the present elegant American genus, does not appear.—Linn. Gen. 187. Schreb. 249. Willd. Sp. Pl. v. 2. 301. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 240. Pursh v. 1. 257. Juss. 330. Lamarck Illustr. t. 283. Gærtn. t. 112.—Class and order, *Oсандρια Monogynia*. Nat. Ord. *Calycanthema*, Linn. *Melastoma*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, tubular, oblong, swelling in the lower part; limb in four deep, acute segments, without any intermediate teeth or scales; permanent. Cor.

Petals four, roundish, spreading, inserted into the calyx. *Stam.* Filaments eight, thread-shaped, inserted into the calyx, longer than its limb; anthers declining, furrowed, linear, obtuse, versatile, with a curved beak. *Pist.* Germen roundish, superior, unconnected with the tube of the calyx; style simple, the length of the stamens, declining; stigma oblong, obtuse. *Peric.* Capsule roundish, of four cells and four valves, within the body of the calyx, but unconnected with it. *Seeds* numerous, roundish. *Receptacles* four, attached to the central column.

Eff. Ch. Calyx with four permanent simple teeth. Petals four, inserted into the calyx. Anthers declining, beaked. Capsule of four cells, within the body of the calyx.

Obf. For the difference between this genus and OSBECKIA, see that article.

Willdenow has 17 species of *Rhexia*, but we have, not the means of correctly ascertaining the generic characters of all of them. They are divided into two sections, of which the following examples may suffice.

Section 1. *Leaves sessile.*

R. virginica. Virginian *Rhexia*. Linn. Sp. Pl. 194. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 968.—Leaves sessile, lanceolate, three-ribbed, with fringe-like teeth. Calyx fringed with glands.—Native of watery places in North America, flowering in July and August. It succeeds tolerably with us, in a bog bed, with plenty of water, but requires shelter in winter; nor is it fit for general cultivation; which is much to be regretted, considering the great beauty and singularity of the large crimson flowers, with their great yellow curved anthers. The root is fibrous, perennial. Stem herbaceous, erect, square, with membranous angles. Leaves strongly ribbed, smooth, with acute slender teeth. Panicle forked, spreading. Calyx brown, besprinkled with hairs, whose points are glandular and viscid.

R. mariana. Maryland *Rhexia*. Linn. Sp. Pl. 491. Willd. n. 2. Ait. n. 2. (*Lyimachia non papposa, terra marianæ, &c.*; Pluk. Mant. 123. t. 428. f. 1. Lamarck, f. 1?)—"Leaves sessile, lanceolate, three-ribbed, fringed with soft hairs. Hairs of the calyx stellated."—Found in bogs, and sandy woods, near waters, from New Jersey to Carolina, flowering in July and August. From one to three feet high. Flowers handsome, either purple, light red, or pale. *Pursh.*

Section 2. *Leaves stalked.*

R. glutinosa. Viscid Shrubby *Rhexia*. Linn. Suppl. 216. Willd. n. 8.—Leaves stalked, opposite, elliptical, three-ribbed, smooth. Stem shrubby. Flowers in terminal, dense, forked panicles. Calyx smooth.—Found in New Granada by Mutis, who sent fine dried specimens to Linnæus, along with an Indian-ink drawing, cited in the Supplement as a published work. The whole plant is very handsome, quite destitute of pubescence, but the calyx, and upper side of the leaves, are extremely glutinous. The leaves are rather above an inch long, with three ribs, united above their base; the under side pale and yellowish. Flowers copious, large, purple.

R. inconstans. Stitch-leaved *Rhexia*. "Vahl. Ecl. v. 1. 37." Willd. n. 13. (*Osbeckia ornata*; Swartz Ind. Occ. v. 2. 647.)—Leaves ovate, clothed with depressed bristles; pale and three-ribbed beneath. Panicle forked, of few flowers. Calyx rough with spreading bristles.—Native of elevated situations on the mountains of Guadaloupe, Nevis, Montserrat, St. Kit's, &c. among mosses.—The stems are a foot or two high, erect, branched, rigid, square and bristly. Leaves ovate, a quarter of an inch long, their green convex upper side most elegantly clothed with strong, depressed, yellow bristles, as if stitched with gold thread. Flowers purple, usually five-cleft.

R. aquatica. Marsh *Rhexia*. Swartz Ind. Occ. v. 2. 650. Willd. n. 16. Ait. n. 3. (*Melastoma aquatica*; Aubl. Guian. v. 1. 430. t. 169.)—Leaves opposite, heart-shaped, minutely crenate, nearly smooth. Panicles terminal, three-forked, slender, widely spreading, many-flowered.—Native of watery places in Guiana and the West Indies.—Stems shrubby, a yard high. Leaves flat, above an inch long, pointed. Flowers copious, rather small, white, with purple stamens. Calyx smooth.

RHEXIA, in *Gardening*, contains plants of the hardy, herbaceous, perennial kind, of which the species cultivated are; the Virginian *rhexia* (*R. virginica*); and the Maryland *rhexia* (*R. mariana*).

Method of Culture.—These plants may be increased by sowing the seeds procured from their native situations, in the autumn or spring, in pots filled with good fresh mould, placing them under the protection of frames, or if in a mild hot-bed they will be rendered more forward. When sown at the latter season, the plants seldom appear the same year. When the plants have attained sufficient growth they should be planted out partly in a dry sheltered east border and partly in pots, to have the protection of a frame against the frosts in winter. They flower the second year, and with care continue three or four.

And they may be introduced, as they afford ornament, in the borders as well as among flowery potted plants.

RHEXIS, or RHEGMA, formed from *ῥήξις, rupture*, of *ῥήγνυμι, I break*, in *Surgery*, denotes a rupture of the corner of the eye.

RHENZABERN, in *Geography*, a town of France, in the department of the Lower Rhine; 8 miles S.E. of Landau.

RHIBII, in *Ancient Geography*, a people of Scythia, on this side of the Imaus, near the river Oxus, to which belonged the town of Dauaba. Ptolemy.

RHIGIA, a town situated in the interior of the eastern part of Hibernia, near Rhæbe, according to Ptolemy.

RHIME, or RINE, in *Poetry*. See RHYME.

RHINANTHUS, in *Botany*, derived from *ῥίς, a nose*, or *snout*, and *ανθος, a flower*, because of its ringent corolla, compressed at the upper lip, so as to resemble the snout of some animal.—Linn. 304. Schreb. 400. Willd. Sp. Pl. v. 3. 188. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 649. Ait. Hort. Kew. v. 4. 2. Pursh 429. Michaux. Boreal-Amer. v. 2. 17. Juss. 101. Lamarck Illustr. t. 517. Gærtn. t. 54. (*Pedicularis*; Tournef. t. 77. Elephas; Tournef. t. 482.)—Class and order, *Didynamia Angiosperma*. Nat. Ord. *Personate*, Linn. *Pediculares*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, roundish, inflated, compressed, four-cleft, permanent. *Cor.* of one petal, ringent; tube rather cylindrical, the length of the calyx; limb gaping, compressed at the base: upper lip helmet-shaped, compressed, emarginate, narrower; lower spreading, flat, trifid half way down, obtuse, the middle segment broader. *Stam.* Filaments four, the length of the upper lip, the two shorter ones concealed under it; anthers incumbent, cloven on one side, hairy. *Pist.* Germen superior, ovate, compressed; style thread-shaped, longer than the stamens, but standing between them; stigma obtuse, inflexed. *Peric.* Capsule obtuse, erect, compressed, of two cells and two valves, gaping at the margins; partition contrary. *Seeds* numerous, compressed.

Obf. ELEPHAS of Tournefort has the margin of the capsule blunt; the seeds simple; and the calyx unequal, of two lips. It was so named from the resemblance its flowers bear to an elephant's trunk.

CRISTA-GALLI of Rivinus has the margin of the capsule extended,

extended, the seeds membranous, clothed with wool; and the calyx equal, four-cleft.

Eff. Ch. Calyx inflated, compressed, four-toothed. Upper lip of the corolla compressed. Capsule of two cells, blunt, compressed. Seeds imbricated, flat.

1. *R. orientalis*. Linn. Sp. Pl. 840. (*Elephas orientalis flore magno probosce incurva*; Tournef. Voyage, v. 2. 126, with a figure.)—Upper lip of the corolla awl-shaped, incurved.—Native of the Levant, on the confines of Persia, flowering in July.—Stems more than a foot high, hollow, square, hairy. Leaves opposite, on short stalks, notched, hairy, veined. Flowers on the upper part of the stems, fragrant, of a yellow colour, with a brown spot on the lower lip and two red ones on the upper. Tournefort reckons this a very ornamental plant.

2. *R. Elephas*. Linn. Sp. Pl. 840. (*Elephas Campoclaenium*; Column. Eepr. 186. t. 188.)—Upper lip of the corolla awl-shaped, straight.—Native of shady woods in Italy, flowering in May.—This annual is very similar in habit to the last, but its calyx is trifid, with two of the segments recurved, and the third larger, erect, plaited, acute. Tournefort mentions a variety of this which he found on the coast of the Black sea.

3. *R. Crifla-galli*. Yellow Rattle. Linn. Sp. Pl. 840. Engl. Bot. t. 657. Curt. Lond. fasc. 5. t. 43. Mart. Rust. t. 148.—Upper lip of the corolla arched. Calyx smooth. Leaves lanceolate, serrated.—Common in our meadows and pastures, flowering from June to August. Root annual, fibrous. Stem branched, smooth, frequently spotted. Leaves opposite, sessile, rough; heart-shaped at the base. Flowers somewhat alternate, on short stalks, yellow. Seeds with a membranous border. The English name has obtained, from the rattling of its seeds in the capsule.

4. *R. Trixago*. Linn. Sp. Pl. 840. (*Bartia Trixago*; Sin. Prodr. Fl. Græc. Sibth. v. 1. 427. *Trixago apula unicaulis*; Column. Eepr. 199. t. 197.)—Calyx hairy or downy. Leaves opposite, bluntly serrated. Stem perfectly simple.—Native of Italy, the south of France, and Palestine. It flowers in May.—Root annual, but throwing out runners. Stem more than a foot high, straight, firm, square, rather woody. Leaves long, narrow, pale green, toothed or rather jagged. Flowers in large, yellow spikes. Ray observes that the figure of Columna possibly may be a variety of this species, for it differs in a few slight particulars.

5. *R. maximus*. Willd. n. 5. Desfont. Atlant. v. 2. 34.—Lower lip of the corolla longer than the upper; segments obtuse, equal. Calyx villous. Upper leaves alternate, oblong, bluntly toothed. Stem branched.—Native of Crete. We know not of any figure of this species which is admitted on the authority of Willdenow and Desfontaines.—Stem from eighteen inches to two feet high, branched at the upper part, and downy. Lower leaves opposite. Flowers in yellow spikes at the tops of the stem and branches. This species has much the appearance of *Bartia viscosa*, of which indeed the *R. maximus* of Lamarek is merely a variety. The same author makes the present a variety of the following.

6. *R. versicolor*. Willd. n. 6. Desfont. Atlant. v. 2. 33.—Corolla gaping; lower lip longer than the upper; segments obtuse; the middle one narrower. Calyx villous. Leaves mostly opposite, lanceolate, the upper ones toothed at the base. Stem simple.—Native of Italy and the north of Africa. This differs from the preceding, in having a simple stem. Leaves linear-lanceolate, the upper ones only toothed at the base. Bractæas ovate, acuminate. Corolla only half as large, of a purple colour, the middle segment of the lower lip narrower than the other two.

7. *R. capensis*. Willd. n. 7. (*Buchnera africana*; Linn. Sp. Pl. 879.)—Calyx downy. Bractæas ovate. Leaves lanceolate, toothed.—Native of the Cape of Good Hope. This is nearly allied to *R. Trixago*, becoming totally black in drying.—The leaves have three or four teeth on each side, the upper ones sometimes alternate. Bractæas downy, a little pointed. Calyx four-cleft, obtuse as in *Crifla-galli*.

8. *R. indicus*. Linn. Sp. Pl. 841. Fl. Zeylan. 107. Burm. Ind. 131. t. 39. f. 1.—Leaves nearly lanceolate, hairy, entire.—Native of Ceylon.—Root annual. Stem a span high, erect, simple, square, hispid. Leaves opposite, small. Flowers sessile, solitary, opposite, turned to one side.

9. *R. virginicus*. Linn. Sp. Pl. 841. Gronov. Virg. 192.—Corolla spreading at the throat. Leaves sinuated and toothed.—Native of Virginia. This plant is nearly akin to *Gerardia*, of which it is most probably a species. The anthers are rough with hairs.

10. *R. trifida*. Willd. n. 10. Vahl. Symb. v. 1. 44.—Corolla wide at the throat. Leaves trifid.—Native of sandy hills in Armenia and Galatia.—Root annual. Stem six inches high, herbaceous, ascending, quite simple, rather downy, round. Leaves opposite, sessile, downy, ribbed, deeply three-cleft. Flowers axillary, solitary, opposite, sessile.

RHINBERG, in *Geography*. See RHEINBERG.

RHINE, a river which rises in the Grison Alps in three branches, which unite into one stream. Cæsar is the most ancient author who has traced the course of this river from its source in the Alps to its discharge into the sea. According to this writer it commenced in the territory of the Lepontii; and Pomponius Mela mentions two lakes which it traverses soon after, viz. the "Lacus Venetus" and the "Lacus Aconius." Of the descriptions given by ancient writers of this river, that of Tacitus is the most precise and satisfactory. The Rhine, says this historian, after having pursued its course in one bed, and arriving near the country of the Batavi, divides itself into two branches; one of which preserves its name and the rapidity of its course along the borders of Germany until it discharges itself into the sea; the other runs towards Gaul, in a larger channel and more tranquil state, and is called by the people of the country "Vahalis," or Wahal. But it soon changes this name for that of "Mosa," or Meuse, and blended with this river discharges itself into the ocean. Such is the account of Tacitus, to which we shall subjoin some other particulars from ancient writers. The Rhine, which, as we have said, has its source in the Alps, assumes a northerly direction, and for a considerable interval separates Gaul from Germany. At the town of "Burgenatium," or "Quadruburgium," it separated itself into two arms or branches; the one flowing northward, and the other towards the west. This last assumed the name of Vahalis (Vahal), and watered the towns of Noviomagus, Grinnes, &c. united with the Mosa or Meuse, and in this confluent state discharged itself into the sea. The other branch, which ran in a northerly direction, watered Arenatium, since called Castra Herculis; at which place commenced the canal of Drusus, "fossa Drusiana." Here a new division took place; the canal of Drusus pursued a northerly course, and the bed of the Rhine was directed towards the west. This last watered, beside other places, Batavodurum, Trajectum, Lugdunum Batavorum, and emptied itself into the sea, at a place called "Castellum Romanum." We ought, however, to observe, that near Trajectum it furnished a small branch which had a northern course. The canal of Drusus flowed northwards, and it is now called the Yssel. This canal, before it reached the sea, traversed a small lake called Flevo, from which issued

a small river of the same name, which ran towards the sea in a northerly direction, and discharged itself into it near a place called "Castellum," which defended the entrance of this river. The lake just mentioned is considerably enlarged, and communicates with the sea under the name of Zuiderzee. The Rhine has been almost always regarded by the Romans as the boundary of their empire between Gaul, which they had conquered, and Germany, into which they made frequent incursions. According to modern accounts of the course of the Rhine, it commences, as we have said, in the Alps of the Grisons in three branches, which afterwards unite into one stream. The principal branch descends from the mountain of St. Gothard, and runs into the lake of Constance, near Rheineck; traversing the lake of Constance and Zell, it passes near Stein, Schaffhausen, Eglisau, Keiserstuhl, Seekingen, Rheinfelden, Bâle, Huningue, Straßburg, Spire, Worms, Oppenheim, Bingen, Mentz, St. Goar, Coblenz, Bonne, Cologne, Zons, Nuys, Dulléldorp, Duyfberg, Rees, and Emerie, a little below which a large branch separates to the left, and takes the name of Wahal; it then proceeds to Huiffen and Arnheim, near which another branch breaks off to the right and joins the Issel. The stream that still maintains the name of Rhine passes on to Wageningen, and Wyck le Duerfede, where it is again divided. The larger part to the left takes the name of the Léck and joins the Meuse; the smaller and less branch passes by Utrecht, Voerden, Leyden, &c. and loses itself at last in the sand, just before it reaches the German sea, a few miles after it has left Leyden. By the treaty of Paris in 1814, the Rhine is to remain as the boundary of France and Germany, and the main stream of this river constitutes the frontier, provided however that the changes that may hereafter take place in the course of that river shall not affect the property of the islands.

RHINE is also a river of Brandenburg, which runs into the Havel, 10 miles above Havelburg.—Also, a river of France, which runs into the Loire, near Roanne.

RHINE, *Circle of the Lower*, a division of Germany, bounded by the circles of Westphalia, Upper Rhine, Franconia, and Swabia, and by the duchy of Luxembourg and France. In conjunction with the circle of the Upper, it is said to contain 960 square German miles. The states of this circle were the electors of Mentz, Treves, and Cologne, together with the Palatine, the duke of Arenberg, the prince of Taxis, the Teutonic bailiwick of Coblenz, the prince of Nassau-Dietz, on account of the feignory of Beilstein, the elector of Treves, on account of Lower Henburg, and the count of Sinfendorf, on account of the burgraviate of Rheineck. The claim of the town of Gelnhausen was disputed. The summoning prince and director of the circle was the elector of Mentz. The diets of the circle have ever since the middle of the 17th century been held at Franfort on the Mayn. This circle was one of those called the "anterior circles," but which, in the years 1697 and 1702, formed with each other a mutual compact for defence against the attacks of an enemy. This compact continued, and the circle always appointed its quota of horse and foot; which quota, as well as the contribution of the circle to the aid of the empire, was generally equal to that of the circle of the Upper Rhine. In regard to religion, this circle was reckoned among the mixed.

RHINE, *Circle of the Upper*, was bounded by the circles of the Lower Rhine, Westphalia, Upper and Lower Saxony, Swabia, and Franconia, and by those of France, formerly called Alsace and Lorraine, in the latter of which were some lands belonging to this circle. The states belonging to this circle were the bishoprics of Worms and

Spire, with the provostship of Weiffenburg, Straßburg, Bâle, and Fulda, and the commandery of the order of St. John, and also the princely abbey of Prum, with the provostship of Odenheim, and the electorate palatinate of Simmern, Lautern and Veldenz, the palatinate of Deux-Ponts, Hesse-Cassel, Hesse-Darmstadt, Hersfeld or Hirschfeld, and Sponheim, the margraviates of Nomeny, Salm with Kirburg, Nassau-Weilburg, Nassau-Ufingen, Nassau-Idstein, Nassau-Saarbrücken, and Otweiler, together with those of Waldeck, Hanau-Munzenberg, Hanau-Lichtenburg, Solms-Hohenfolms, Solms-Braunfels, Solms-Ruddeheim, Solms-Laubach, and the electorate of Mentz on account of Königstein, that of Stolberg on account of the same, those of Isenburg-Birstein, Isenburg-Badingen, Waffersbach, and Mueholz, Grewiler, Grumbach, Dhaun, Leinengin-Hartenburg, Leinengin-Westerburg, and Grunstadt, Munzfelden, Witgenstein of Witgenstein, Witgenstein-Berleburg, Falkenstein, Reipolzkirchen, Creange, Wartenburg, Bretzenheim, Dachstuhl, and Ollbruck, and the imperial cities of Worms, Spire, Franfort, Friedburg, and Wetzlar. The bishop of Worms, and the elector palatinate for the duchy of Simmern, were summoning princes of this circle. The diets of the circle of the Upper Rhine were formerly held at Worms, but in the last century at Franfort; but the chancery circle of the archives belonging to it were kept at the directory at Worms. This circle, with regard to religion, was reckoned among the mixed, and to the chamber judicatory actually presented two assessors.

RHINE, *Lower*, one of the ten departments of the N.E. region of France, bounded on the N. by the departments of Mont Tonnerre and the Moselle, on the E. by the Rhine, on the S. by the department of the Upper Rhine, and on the W. by the departments of the Vosges, the Meurthe, and the Moselle, situated on the left bank of the Rhine, in N. lat. 48° 45', containing 5695 kilometres, or 288 square leagues, and 444,858 inhabitants, and divided into four districts, including 37 cantons, and 616 communes. The four districts or circles are, Wissembourg, including 113,786 inhabitants, Saverne with 78,398, Straßbourg with 155,647, and Barr with 97,027 inhabitants. According to M. Hassenfratz's statement, its extent in French leagues is 30 in length, and 15 in breadth. The number of circles is 5, and of cantons 30, and its population 415,080. Its contributions to the land-tax, &c. in the 11th year of the French era, amounted to 3,609,442 francs; and its expences, administrative, judiciary, and for public instruction, amounted to 359,740 fr. 33 cents. The capital of this department is Straßbourg, and it comprehends that district which, before the revolution, was Lower Alsace. As it lies between mount Vosges and the Rhine, it is diversified with eminences and plains, producing grain, wine, fruits, tobacco, saffron, and also with forests and plains.

RHINE, *Upper*, one of the ten departments of the N.E. region of France, bounded on the N. by the department of the Lower Rhine, on the S. by Switzerland, and on the W. by the departments of the Upper Saone and Vosges, situated on the left hand of the Rhine, in N. lat. 47° 40', containing 6030 kilometres, or 280 square leagues, and 382,285 inhabitants, and divided into five districts, or circles, including 39 cantons, and 703 communes. The five districts are Colmar, comprehending 144,821 inhabitants; Altkirch, 83,515; Delemont, 35,779; Porentruy, 34,910; and Befort, 83,260. According to the statement of M. Hassenfratz, its extent in French leagues is 24 in length, and 14 in breadth: its circles are 3, its cantons are 25, and its population consists of 283,252 persons. Its contributions to the land-tax, &c. in the

the 11th year of the French era, amounted to 2,837,063 fr. and its expences, administrative, judiciary, and for public instruction, amounted to 354,279 fr. Its capital is Colmar, and it is composed of Upper Alsace, Sundtgant, Porentruy, and a part of the bishopric of Bâle. The soil is in some parts moderately fertile, and in others yields all sorts of grain, wine, and pastures. It has mines of silver, copper, lead, iron, and coal, with mineral springs.

RHINE, *Confederation of the*, now abolished. See CONFEDERATION, &c.

RHINE and Moselle, one of the thirteen departments of that region of France called the Rennet country, bounded on the N. by the department of the Roer, on the E. by the Rhine, on the S. by the departments of Mont Tonnerre and the Saone, and on the W. by the departments of the Sarre and the Roer; situated in N. lat. 50° 15', and formed of a part of the electorate of Treves, S. of Roer, and on the left hand of the Rhine. Its territorial extent is 4860 kilio metres, or 290 square leagues, and the number of inhabitants is 203,290. It is divided into three circles or districts, including 30 cantons, and 675 communes. The districts are Coblentz, containing 69,900 inhabitants; Born, 70,508; and Simmern, 62,882. According to Haslenfratz, its extent in French leagues is 25 in length, and 12 in breadth: it contains 3 circles, and 30 cantons, and a population of 372,000 persons. Its contributions to the land-tax, &c. in the year 11, amounted to 1,717,463 fr.; and its expences, administrative, judiciary, and for public instruction, were 239,883 fr. 33 cents. The capital of this department is Coblentz. Several tracts in it are hilly and wooded; and others, though but indifferently fertile, produce considerable crops of grain, flax, hemp, wine, fruits, and pastures. It has mines of iron, quarries of marble, stone, &c.

RHINE, in *Ichthyology*, a name given by Aristotle, Apian, and most of the Greek writers, to that species of the squalus, which we usually call the *squatina*: the *squatus* of Isidore and Pliny. Artedi has distinguished this from all the other species of the squalus, by the having no pinna ani, and the mouth in the extremity of the snout. See SQUALUS.

RHINE-GRAVE, in Germany, a count palatine of the Rhine. See GRAVE and PALATINE.

RHINE-LAND ROD, in *Fortification*, &c. a measure of two fathom, or twelve feet, used by the Dutch and German engineers, &c.

RHINENCHYTES, in *Surgery*, a syringe for the nose.

RHINFELS, in *Geography*, a town and fortress of Germany, in the county of Katzenelubogen, near St. Goar.

RHINGAU, or **RHËINGAU**, a tract of country along the Rhine, in the electorate of Mentz, extending from Baccharach to Mentz, celebrated for its excellent wine.

RHINGAU, in *Ichthyology*, the name given by some authors to the lavaretus, a small fish caught in the German lakes, and sent in pickle into many parts of the world.

RHINHEIM, in *Geography*. See REINHEIM.

RHINIUM, in *Botany*, a name given by Schreber, in his Genera, 701, to the *Tigarea* of Aublet, Lamarck Illustr. t. 826; but in his addenda, 833, referred to TETRACERA; see that article hereafter.

RHINOBATOS, in *Ichthyology*, the name of a flat cartilaginous fish, of the *squatina* or monk-fish kind, but differing from it in this, that the body is proportionably longer, and the head is more pointed; and the mouth is a great way below the end of the snout, and placed under the head. It is from three to four feet long, and is common in the Mediterranean, and brought to market in some parts of

Naples. This is a species of ray in the Linnæan system. See RAMA.

RHINOCEROS, in *Zoology*, a genus of the class Mammalia and order Bruta, of which the generic character is, horn solid, perennial, conic, placed on the nose, not adhering to the bone. There are two

Species.

UNICORNIS; One-horned Rhinoceros. The one horn of this animal marks the species. It inhabits marshy places between the tropics; lives on thorns and spinous plants; it may be tamed, and becomes mild, but when enraged it will overturn trees with its violence; its sight is weak, but its hearing and smell are very acute.

In the year 1739 we had a young rhinoceros with one horn shewn in England, of which Dr. Parsons has given a very accurate account in the Philosophical Transactions, N° 470. p. 523, &c. or Abridg. vol. ix. p. 94, &c.

The creature fed on rice, fugar, and hay; his keeper used to mix the rice and fugar in the following manner: seven pounds of rice and three pounds of fugar made the provision for one day; he eat this at three meals; and besides this he eat about a truss of hay every week, and a large quantity of greens that were brought to him at different times, and of which he seemed more fond than of dried food. He drank often, and always swallowed a large quantity of water at a time.

He appeared very peaceable in his temper, and bore to be handled on any part of his body with great patience, except when he was hungry; but he was then always outrageous, as also when he was struck. His most violent passions, even on the last occasion, were however always immediately appeased by giving him victuals.

Notwithstanding the lumpish aspect and heavy make of this creature, he would jump about very nimbly in his fits of passion, and often leap to a great height; and one common mark of his fury was the striking his head against the walls, or any thing else that was in the way, and this he would do with terrible violence. He was very apt to fall into these passions in a morning, before his rice and fugar were given him, and from the whole he appeared quite untractable, and seemed able, in his passions, to have run so fast, as that a man on foot could not have escaped him.

This creature was two years old, and did not exceed a young heifer in height, but was remarkably broad and thick. His head was very large; and the hinder part of it, near the ears, remarkably elevated above the rest of the face, which was flat, and sunk down in a remarkable manner in the middle, rising again towards the origin of the horn, but in a much smaller degree.

The horn in this young animal did not rise above an inch high from its tough basis (though in full grown animals it is sometimes three feet and a half long), and was black and smooth at the top, but ragged downwards; and the determination of its growth is backward, not straight up; this is very evidently seen in the horns of old rhinoceroses, which are always curved in a considerable degree that way. If we consider the proportion of this animal's size to the length of its horn, and thence carry the proportion to that between the large horns we see in the museums of the curious, we must suppose the animal of a very stupendous size, when at its full growth.

The sides of the under-jaw in this creature stand very wide asunder, slanting outward to the lower edge, and backward to the neck; the edges turn outwards from this structure of the bones, and the head necessarily looks very large. The rhinoceros has four cutting teeth, one on each corner

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corner of each jaw, and six grinders in each; the first remote from the cutting teeth. That part of the head which reaches from the fore-part of the horn to the upper lip, may be called the nose: this is very thick and bulky, and has a kind of circular sweep down towards the nostrils; and on all this part there is a great number of rugæ or wrinkles.

The nostrils are situated very low, in the same direction with the opening of the mouth, and not more than an inch from it; and, when viewed in a fore-view, the whole nose, from the top of the horn to the verge of the lower lip, is shaped like a bell. The under lip is like that of an ox, but the upper more like that of a horse, and he uses it as that creature does, to gather up hay from the rack, or grafs from the ground: but with this superior advantage, that this creature has a power of extending this lip to six or seven inches in length from the nose, and there drawing it to a point: with this lip, thus extended, the creature is able to grasp a stick, or any small substance, and hold it extremely fast; and this power of prolonging the lip serves, in many purposes, to the same end as the trunk of that other unwieldy animal, the elephant.

The tongue of the rhinoceros is said to be so rough as to be able to rub a man's flesh off from the bones; but in this young subject it was so soft, that it resembled that of a calf. It may possibly grow harder with age; but the story of its effects seems of a piece with the many other false marvels reported of this animal. The eyes are dull and sleepy, much like those of a hog in shape; he seldom opens them entirely; and it is to be observed, that they are situated nearer the nose than those of any other known quadruped. The ears are broad and thin towards the top; the neck is very short; the shoulders are thick and heavy; the body is thick, and juts out at the sides, and has a hollow in the back; the belly hangs low; the legs are short, thick, and strong; the hoofs are divided into three parts, each pointing forward; the tail is slender, flattened at the end, and covered on the sides with very stiff thick black hairs; the skin is naked, rough or tuberculated, lying about the neck in vast folds; there is another fold from the shoulders to the fore-legs, and another from the hind part of the back to the thighs. The skin is thick, and seems almost impenetrable, inasmuch that it will turn the edge of a scymitar, and resist a musket-ball; it feels like a piece of board of half an inch thick. It is covered in all parts, more or less, with a sort of incrustations, resembling scales. These are small on the neck, and largest of all on the shoulders and hips; between the folds of this thick skin, the cuticle, which is left bare, is soft and easily penetrable. The scabby incrustations of the skin have been called scales by some writers; but this is a very wrong term, for they have nothing of the nature of scales, nor any thing of regularity in them.

The creature is of the retromingent, and therefore probably of the retrogenerative kind. Those animals that have been brought to Europe have been young and small; but, according to Bontius, they equal the elephant in the bulk of their bodies, though they are lower, on account of the shortness of their legs. They inhabit Bengal, Siam, Cochinchina, Quangsi in China, and the isles of Java and Sumatra. They are fond of shady forests, the neighbourhood of rivers, and marshy places; and are fond of wallowing in the mud like the hog. The rhinoceros is a solitary animal, brings one young at a time; is quiet and inoffensive, but furious when provoked; very swift and dangerous; and, though dull of sight, has a most exquisite smell. It grunts like a hog. The flesh of this animal is eaten. The skin, flesh, hoofs, teeth, and dung itself, are used in India medicinally. The horns are in great repute as an antidote

against poison, especially those of the virgin female, called *abbada*; cups of which are said to communicate virtue to the liquor poured into them. Redi, who has been very sagacious in discovering the falsity of many of the pretended medicines taken from animals, yet gives us, on the testimony of his own experience, an account of some very remarkable virtues in the parts of the rhinoceros. The blood, he assures us, is excellent in colics and in dysenteries. The decoction of the skin, he assures us, is a grand stomachic antidote; and the horns are very valuable and alexipharmic.

This animal is the unicorn of scripture, and the Indian *as* of Aristotle, who says it has but one horn.

BICORNIS; Two-horned Rhinoceros. This species inhabits Africa, but, according to Pallas, the bones of it are found buried in the north of Russia. Its flesh resembles that of a hog; the viscera those of a horse; the second horn is shorter, and placed over the first; it has no gall-bladder, and no fore-teeth; the skin is without folds, granulated, and of a deep ashen-grey; between the legs it is smooth, and flesh-coloured; in other parts there are a few bristles, but they are most numerous about the ears and end of the tail. This animal inhabits Africa only; and seems, in its manners, to agree with the former. The mischief it does is more the effect of a senseless impulse than of rage; for, though its sight is bad, its senses of hearing and smelling are exquisite, so that the least noise or scent puts it in motion; and in running to the spot from which the alarm proceeds, it overturns and tramples on animals, or any thing else which it meets with in its way, but never stays or returns to renew the charge. There is a variety, but not often seen, that has three horns; the third being an excellence on one of the others.

Mr. Bruce's description of the manner of feeding, as well as of some other particulars relative to the two-horned rhinoceros, seems highly worthy of notice. He informs us, that "besides the trees capable of most resistance, there are, in the vast forests within the rains, trees of a softer consistence, and of a very succulent quality, which seem to be destined for his principal food. For the purpose of gaining the highest branches of these, his upper lip is capable of being lengthened out, so as to increase his power of laying hold with this, in the same manner as the elephant does with his trunk. With this lip, and the assistance of his tongue, he pulls down the upper branches which have most leaves, and these he devours first. Having stript the tree of its branches, he does not therefore abandon it; but, placing his snout as low in the trunk as he finds his horns will enter, he rips up the body of the tree, and reduces it to thin pieces, like so many laths; and when he has thus prepared it, he embraces as much of it as he can in his monstrous jaws, and twists it round with as much ease as an ox would do a root of celery, or any such pot-herb or garden-stuff.

"When pursued, and in fear, he possesses an astonishing degree of swiftness, considering his size, the apparent unwieldiness of his body, his great weight before, and the shortness of his legs. He is long, and has a kind of trot, which, after a few minutes, increases in a great proportion, and takes in a great distance; but this is to be understood with a degree of moderation. It is not true, that in a plain he beats the horse in swiftness. I have passed him with ease, and seen many worse mounted do the same; and though it is certainly true that a horse can very seldom come up with him, this is owing to his cunning, but not his swiftness. He makes constantly from wood to wood, and forces himself into the thickest part of them. The trees that are dry are broke down, like as with a cannon-shot, and fall behind him,

him, and on his side, in all directions. Others that are more pliable, greener, or fuller of sap, are bent back by his weight, and the velocity of his motions; and, after he has passed, restoring themselves like a green branch to their natural position, they sweep the incautious pursuer and his horse from the ground, and dash them in pieces against the surrounding trees.

“The eyes of the rhinoceros are very small, and he seldom turns his head, and therefore sees nothing but what is before him. To this he owes his death, and never escapes, if there is so much plain as to enable the horse to get before him. His pride and fury then make him lay aside all thoughts of escaping, but by victory over his enemy. He stands for a moment at bay; then, at a start, runs straight forward at the horse, like the wild boar, whom, in his manner of action, he very much resembles. The horse easily avoids him, by turning short to a side; and this is the fatal instant: the naked man, with the sword, drops from behind the principal horseman, and, unseen by the rhinoceros, who is seeking his enemy, the horse, he gives him a stroke across the tendon of the heel, which renders him incapable of further flight or resistance.

“In speaking of the great quantity of food necessary to support this enormous mass, we must likewise consider the vast quantity of water which he needs. No country but that of the Shangalla, which he possesses, deluged with six months’ rain, and full of large and deep basins, made in the living rock, and shaded by dark woods from evaporation, or watered by large and deep rivers, which never fall low or to a state of dryness, can supply the vast draughts of this monstrous creature. But it is not for drinking alone that he frequents wet and marshy places: large, fierce, and strong as he is, he must submit to prepare himself against the weakest of all adversaries. The great consumption he constantly makes of food and water necessarily confine him to certain limited spaces; for it is not every place that can maintain him. He cannot emigrate, or seek his defence among the sands of Atbara.”

The rhinoceros with two horns was the species described by Martial, under the name of *rhinoceros cornu gemino*, who relates its combat with the bear.

“Namque gravem gemino cornu sic extulit ursum,
Jactat ut impositas taurus in astra pilas.”

Spect. Epig. 22.

The Romans, who procured their rhinoceroses from Africa, represent them with double horns. That figured in the Porenstine pavement, and that in a coin of Domitian, have two horns; that which Pausanias describes (ix. 9.) under the name of Ethiopian bull, had one horn in the nose, and another lesser higher up; and Cosmas Ægyptius (tom. ii. 334.), who travelled into Æthiopia, in the reign of Justinian, also attributes to it the same number. Augustus introduced a rhinoceros (probably of this kind) into the shows, on occasion of his triumph over Cleopatra. Dion Cassius, lib. ii. Phil. Transf. abr. vol. ix. ubi supra. Id. vol. lvi. p. 32, &c.

M. Geoffroy of France thinks there are, or at least have been, no less than five different species of the rhinoceros; viz. 1. The rhinoceros africanus, cornu gemino of Camper, who has given a figure of the skull in the Peterburgh Transactions for 1777. 2. The species found fossil in Siberia, which M. Geoffroy contends is different from the common two-horned rhinoceros, though of that division of the genus. 3. That of which the skull is figured by Camper, and described by him in a letter to Dr. Pallas, in the Peterburgh Transactions. This is a single-horned species, and has been often confounded with the common rhinoceros.

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4. The common single-horned Asiatic rhinoceros. And, 5. The Sumatran rhinoceros, described by Mr. Bell in the Phil. Transf. of the Royal Society of London.

RHINOCEROS *Avis*, in *Ornithology*, the rhinoceros-bird, a name given by authors to a species of Indian raven, called by others *corvus Indicus cornutus*; the beak of which is frequently brought over into Europe. This, in the Linnæan system, is a species of *Buceros*; which see.

It is a very ugly bird, and of a very rank smell. It much exceeds the European raven in bigness, and its head and neck are very thick. Its eyes are very large, and its beak of a very remarkable figure, having a large and thick horn-like protuberance on its upper part. The whole beak is bent like a bow, not hooked at the end like the beaks of the hawk, &c. It is of a yellowish-white below, and on the upper part towards the head is of a fine gay red, and the rest of a yellowish-white; the upper chap is serrated. The horn grows out from the head with this, and runs along it, and bends up at its extremity; its upper and under part are red, its middle yellow. The bird feeds on carrion.

RHINOCEROS, in the *History of Insects*, a species of beetle, so called, because it has a kind of horn upon its head.

RHINOCOLURA, or RHINOCORURA, in *Ancient Geography*, a town of Syria, 22 miles from Raphia, and which formed a kind of boundary between Syria and Egypt. Strabo attributes it to Phœnicia; and Pliny calls the sea, on a strait of which this place is situated, the “Sea of Phœnicia.” Diodorus Siculus says, that this town, situated on the confines of Egypt and Syria, near the sea, was destitute of all the conveniences of life; that its water was bitter and noxious, and that it was surrounded with salt marshes. It was in the vicinity of this place that the Israelites were nourished with quails.

RHINOMACER, in *Entomology*, a genus of insects of the order Coleoptera. The generic character is, antennæ fetaceous, seated on the snout; it has four feelers, growing thicker towards the end; the last joint is truncate. There are three species, none of which are found in this country.

Species.

CURCULIOIDES. This is grey and downy; the antennæ and legs are black. It inhabits Italy. It resembles a curculio. The antennæ are fetaceous and black, and as long as the thorax; the last joint is sharp; the snout is flat, and impressed in the middle.

ATTELABOIDES. This is piceous-downy; the antennæ and legs are testaceous. It is found in divers parts of Sweden. The snout is elevated and projected; the body is cinereous.

CÆRULEUS. This species is of a blueish colour, and it is subvillous; the base of the antennæ and legs are yellow. It inhabits Calabria, and has been thought to be a species of the *Attelabus*; which see.

RHINOPTES, a word used by the ancients to express a person, who, from an ulcer in the great canthus of the eye, laying open the passages to the nose, can see through his nostril.

RHINOW, in *Geography*, a town of the Middle Mark of Brandenburg, on the Rhine; 20 miles N. of Brandenburg.

RHINSBERG. See REINSBERG.

RHINSBERGERS, in *Ecclesiastical History*. See COLLEGIANS.

RHIPÆI MONTES, in *Ancient Geography*. See RHIPÆAN Mountains.

RHIPSALIS, in *Botany*, Gærtn. t. 28. (See CACTUS, sp. 25.) It is curious to observe how the representation of the fructification of this plant, in Miller’s Illustration of the Linnæan system, is made to answer to the generic character of *Cassitha*, for which it had been erroneously taken.

RHIPTASMOS, a word used by the ancients to express

press a restlessness and frequent tossing about, a very common symptom in fevers.

RHISOPHAGI, in *Ancient Geography*, a people of Ethiopia, in the vicinity of the isle of Meroe, upon the banks of the rivers Ataboras and Atapas, according to Diodorus Siculus.

RHISPIA, a town of the Higher Pannonia, at a distance from the Danube, and situated between Savaria and Vincendria. Ptolemy.

RHISUS, a town of Greece, on the coast of Thessaly, according to Strabo and Steph. Byz. Pliny mentions a town of this name in Magnesia.

RHITHYMNA, a town situated on the northern coast of the isle of Crete. Ptolemy.

RHITIA, a town of Africa, in Mauritania Cæsariensis; placed by Ptolemy in the interior of the country between Arina and Victoria.

RHITTUUM, a town of Lower Pannonia, upon the banks of the Danube, between Acumincum Legio and Taururum, according to Ptolemy.

RHIUM, a promontory on the N.E. part of Achaia: it formed with Anti-Rhium, another promontory opposite to it, and more northerly, the strait by which the Ionian sea communicated with the gulf of Corinth.—Also, a town of the Peloponnesus, in Messenia, upon the gulf of Thuriates, opposite to the promontory Tanarus, according to Strabo.—Also, a promontory on the E. side of the island of Corfa, between mount Rhætius and the town Urcipium. Ptolemy.

RHIUSIAVA, a town of Germany, on the banks of the Danube, between Ara Flavæ and Alcimænis. Ptolemy.

RHIW-ABON, or RUABON, in *Geography*, a market-town in the cwmwd of Maelor Gymraeg, cantref of Uwck-Nant, (now called the hundred of Bromfield,) county of Denbigh, North Wales, is situated on rising ground, at the distance of four miles S.S.W. from the town of Wrexham. The market-day here is Monday, weekly; besides which, there are fairs on the last Friday in February, the 22d of May, and the 20th of November. The petty sessions for the Ruabon division of the hundred are held in this town. The church is an ancient structure, but is in good repair, and contains several monumental erections. One, to the memory of the first sir Watkin Williams Wynne, displays a figure of the deceased in a loose robe. On one side is a figure of his son, and on the other that of his daughter, both in kneeling postures. This monument was erected by Ryfbrack. Near it stand those of the late sir Watkin Williams Wynne, bart., and his lady; both of them the workmanship of Nollekens, and worthy of his chaste and classic chisell. The latter exhibits lady Wynne in the character of Hope, standing, and reclining her arm on an urn; the whole being placed upon a pedestal, made in the shape of a Roman altar. The other principal monuments commemorate Henry Wynne, esq., tenth son of sir John Wynne of Gwidir, who died in 1671; sir John Wynne of Wynstay, and his wife Jane; and another sir John Wynne, son of the above, with his wife, the heirs of Watstay. In a chapel, on the south side of the communion table, is likewise an altar tomb, supporting the recumbent figures of a man in armour, and a female habited in a mantle. From an inscription round the edge of the entablature, it appears that these represent John ap Ehs Eyton, esq., who died in 1526, and Elizabeth Caffley, his wife, who died in 1524.

Rhiw-Abon is noted as the birth-place of Dr. David Powell, who translated into English the History of Wales, written by Caradoc of Llancarfan, with the Continuation by Humphrey Llwyd; and who likewise first edited the works of Giraldus Cambrensis, and published a treatise, en-

titled “De Britannica Historia recte intelligenda.” He died in 1590. This parish is very extensive, and contains five townships. The town consists, according to the population returns of 1811, of 263 houses, and 1137 inhabitants. The parish abounds with collieries, the produce of which is conveyed to different parts of the country, by means of the Ellesmere canal, which passes near the town, and forms a junction with the canals that penetrate Wales on the one side, and communicate with the Grand Trunk Navigation on the other. Adjoining Rhiw-Abon is Wynnstay-hall, the seat of sir Watkin Williams Wynne, bart. The house is large, but, owing to the heterogeneous and patched character of its architecture, it possesses little elegance of external appearance. The apartments in the interior, however, are grand and spacious, and contain several good portraits of the Wynnes, the Williamses, and the Seymours, painted by Vandyke, sir Godfrey Kneller, and other eminent artists. Close to the house is a building, originally fitted up as a theatre, but now appropriated for an annual agricultural meeting, auxiliary to the society at Wrexham. A show of cattle takes place on the occasion of each meeting, at which premiums are adjudged for the best specimen of every species of stock, and also for other husbandry improvements. This estate was anciently the residence of Madoc ap Gryffydd Maelor, lord of Bromfield, and founder of Valle-Crucis abbey. From the circumstance of the ancient rampire, called Watt’s Dyke, running through the park, it was long denominated Watstay-park, in allusion thereto. It extends above eight miles in circumference, and is ornamented with plantations, a fine lake, and various buildings. Among the objects of the last mentioned kind is a column, 100 feet high, built of free stone, from a design by the late Mr. Wyatt. It was erected as a tribute of maternal affection, in memory of sir Watkin Williams Wynne, father to the present baronet. In another part of the grounds is a tower, or rotunda, intended to commemorate the heroes of the Cambrian legion, who fell in the cause of loyalty, under sir Watkin, during the late rebellion in Ireland. The spot on which this tower is situated commands an extensive view of mountains, woods, and the meanderings of the Dee. The valley, watered by that river here, displays the most picturesque and romantic scenery, whose beauties peculiarly excited the admiration of the celebrated lord Lyttelton. The turnpike-road from Rhiw-Abon to Oswestry, which crosses this valley, is formed for nearly two miles on the embankment of Offa’s Dyke. It is here ten feet high, and broad enough for two carriages to run abreast. Near this road is a remarkable tumulus, supposed to be the burying-place of some chieftain slain in a battle, fought in this neighbourhood, about the year 1161, between Owain Cyfeiliog, prince of Powys, and the English, and terminated in favour of the ancient Britons. This victory gave rise to the beautiful poem, called “Hirlas Owain,” or the Drinking-Horn of Owain, composed by the prince himself; which, according to Mr. Pennant, ranks with the best Pindaric ode of the Grecian school. About three miles northward from Rhiw-Abon is Erdigg, or Erddig, the seat of Simon Yorke, esq. The house, which has been lately modernized, contains some valuable paintings; and the library is the depository of many curious Welsh MSS., including the Seabright collection. The grounds are laid out with much taste, but the efforts of art are too apparent. The continuation of Watt’s Dyke extends across these grounds, running along one side of a bank between the two vallies, by which the domain is bounded. Not far from hence are the fragments of a cemented wall, and various foundations of buildings, surrounded by a triple intrenchment of a pentagonal form.

Thele

These are supposed by some to be of Roman origin, but others conceive that they mark the site of a Saxon fort, constructed by the Mercians to defend their line of demarcation, as fixed by the great Offa. This last opinion is rendered the more probable, by the fact of there being some vestiges of a similar fort more to the northward, and on the same line. Philip Yorke, esq., ancestor to the present proprietor of Erddig, was author of "The History of the five royal Tribes of Wales;" a work abounding with so much information, that it is greatly to be lamented that he did not favour the world with his intended *Stemmata*, or Fifteen Tribes.

The district in the vicinity of Rhiw-Abon, particularly towards Wrexham, abounds with valuable mines. The iron ore, found in the adjacent mountains, is exceedingly rich, and affords excellent iron. The principal works carried on are those of Brymba and Bersham. The latter, which are situated at Pont-y-Penca, consist of forges, slitting, rolling, and stamping mills, &c. with an extensive cannon foundery, inferior only to that on the banks of the Carron, in North Britain. Besides cannon, these works produce wheels, cogs, bars, pipes, cylinders, rollers, columns, pistons, &c.; also furnace boilers, steam caissons, and various other articles which were formerly made of copper. Carlisle's Topographical Dictionary of Wales, 4to. 1813. A Tour round North Wales, by the Rev. W. Bingley, B.A., F.L.S., 8vo. 2 vols. 1800.

RHIZAGRA, in *Surgery*, an instrument for extracting the stumps of the teeth.

RHIZANA, in *Ancient Geography*, a town placed by Ptolemy in the interior of Dalmatia.—Also, a town of Asia, in Gedrosia, upon the sea-coast near Coiamba. Ptol.—Also, a town placed by Ptolemy in Arachosia, between Alexandria and Arbaca.

RHIZINIUM, or RHISINUM, or *Rhison*, a town of Dalmatia, on a gulf to which it gave the name of Rhisonicus Sinus. Ptol.

RHIZIUM, RHIZÉ, a town of Asia, in the Colchide, on the coast of the Euxine sea, and W. of the mouth of the small river "Rhizius."

RHIZOBOLUS, in *Botany*, a name of Gärtner's, from $\rho\acute{\iota}\zeta\alpha$, a root, and $\beta\alpha\lambda\lambda\alpha$, to throw, or cast, because the plant is remarkable for throwing out a number of roots.—Schreb. 369. Mart. Mill. Dict. v. 4. Gärtner. t. 98. (Caryocar; Linn. Mant. 154. Willd. Sp. Pl. v. 2. 1243. Pekea; Aublet. Guian. v. 1. 594. Juss. 249. Lamarck Illustr. t. 486.)—Class and order, *Polyandria Tetragynia*. Nat. Ord. *Sapindi*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, fleshy, cloven half way down into five, roundish, concave segments. *Cor.* Petals five, ovate, rounded, concave, fleshy, inserted below the segments of the calyx, and much larger. *Stam.* Filaments very numerous, thread-shaped, longer than the corolla, inserted into the receptacle; anthers roundish. *Pist.* Germen superior, square, in the bottom of the calyx; styles four, thread-shaped, longer than the corolla; stigmas obtuse. *Peric.* Drupas four, kidney-shaped, compressed, inserted by their wedge-shaped inner edge into the conical receptacle, of one cell, with a fleshy covering, and a soft pulp like butter. *Seed.* Nuts solitary, kidney-shaped; kernels solitary, kidney-shaped.

Ess. Ch. Calyx five-cleft half way down. Petals five. Germen four-sided, superior. Nuts four, single-celled and single-seeded.

1. *R. butyrosus*. Lesser Suwarrow Nut. (Caryocar butyrosom; Willd. n. 1. Pekea butyrofa; Aubl. Guian. t. 238.)—Fruit smooth. Leaves digitate, smooth on both sides.—Native of woods in Guiana, and cultivated at Ca-

enne; where it flowers in June and July, and bears fruit in September. This lofty tree rises to the height of eighty feet, or more, and is much branched at the summit; the inner branches erect; the outer horizontal or declining. *Trunk* three feet in diameter, with a grey bark, and reddish, compact wood. *Leaves* opposite, digitate; leaflets entire, oval, pointed. *Flowers* white, in large bunches, at the extremities of the branches. *Fruit* yellowish.

2. *R. tuberculifus*. Large, or Common, Suwarrow Nut. (Caryocar tomentosum; Willd. n. 2. C. nuciferum; Linn. Mant. 247. Pekea tuberculosa; Aubl. Guian. t. 239.)—Fruit tubercled. Leaves digitate, downy beneath.—Native of Guiana, producing fruit in July. This tree differs from the preceding in having thicker leaves which are downy beneath, and ash-coloured. *Fruit* larger and tubercled, the pulp dry, not buttery. The nut is sweet and palatable, containing a rich oil. Not unfrequent in our fruiterers' shops, and known by the name of Suwarrow Nut. It is figured in Cluf. Exot. 27. f. 1, by the name of *Amygdala guianensis*.

RHIZOMA, an appellation bestowed, by several late authors, on the tuberous caudex, or body, of some roots; as that of *Iris Germanica*, and many other of the natural order of *Ensatæ* of Linnæus and Gawler. See ROOT.

RHIZOMORPHA, so called from its resemblance to the branching fibrous roots of various plants, is a genus of fungi, established by Persoon, in his Synopsis, 704. One of its species, *R. subcorticalis*, figured by Micheli, Nov. Gen. t. 66. f. 3, is called by that author, p. 125, *Agaricum nigrum reticulatum compressum, e mortuis arboribus inter corticem et lignum, interdum in ipso ligno innascens, ac latè se diffundens*. Ray, Vaillant, and others, have likewise considered this substance as a fungus. Persoon's generic character is

"Creeping, rigid, smooth, with a villous pith."

He enumerates two species besides the above; *subterranea*, found among wet timber-work, in mines; and *setiformis*, found among dead leaves in woods. This last is figured in Dill. Musc. t. 13. f. 11, b. They are all, to us, very obscure, and perhaps imperfect productions.

RHIZOPHORA, a Linnæan genus, whose name is derived from $\rho\acute{\iota}\zeta\alpha$, a root, and $\phi\epsilon\alpha\alpha$, to bear, or carry; the seed germinating before it falls from the branches, and sending down a remarkably long cylindrical root into the earth.—Linn. Gen. 236. Schreb. 317. Willd. Sp. Pl. v. 2. 843. Mart. Mill. Dict. v. 4. Juss. 213. Lamarck Dict. v. 6. 187. Illustr. t. 396. Gärtner. t. 45. Lourier. Cochinch. 296. (Mangles; Plum. Nov. Gen. t. 15. Bruguiera; Lamarck Illustr. t. 397.)—Class and order, *Dodecandria Monogynia*. Nat. Ord. *Holeracea*, Linn. *Carpifolia*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, spreading, cloven into four, or more, oblong, acuminate, permanent segments. *Cor.* Petals four or more, oblong, somewhat shorter than the calyx. *Stam.* Filaments scarcely any, alternately shorter; anthers from four to twelve, small, pointed. *Pist.* Germen superior, roundish; style awl-shaped, cloven half way down, grooved at each side; stigmas acute. *Peric.* fleshy, nearly ovate, including only the base of the seed. *Seed* solitary, oblong-club-shaped, pointed, fleshy at the base.

Obs. The number in the parts of the flower varies.

Ess. Ch. Calyx four or five-cleft. Corolla of four or five petals. Seed solitary, very long, fleshy at the base.

1. *R. conjugata*. Linn. Sp. Pl. 634. Fl. Zeylan. 81.—Leaves ovate-oblong, rather obtuse, entire. Calyx sessile. Fruit cylindrical, awl-shaped.—Native of India. All that is known of this species may be gathered from the *Flora Zeylanica*, where it is described as a tree whose leaves are stalked, smooth. *Calyxes* twin. *Fruit* very long, pendent.

2. *R. gymnorhiza*. Linn. Sp. Pl. 634. (Mangium celsum; Rumph. Amboin. v. 3. 102. t. 68.)—Leaves ovato-lanceolate, entire. Root lying upon the ground.—Found in many parts of the East Indies, and in the islands of the South seas.—A middling-sized tree with a lofty, erect trunk, covered with a thick brown-red bark. Leaves on stalks, smooth, scattered, sometimes heaped together at the top. Flowers solitary, scattered, red, having usually from ten to thirteen petals, and twice as many stamens.

The bark of this tree is useful in dyeing a rufous or chestnut colour, which may easily be changed into a fine permanent black, as Loureiro informs us.

3. *R. Candel*. Linn. Sp. Pl. 634. (Tsjerou-Candel; Rheede Hort. Malab. v. 6. 63. t. 35.)—Leaves obtuse. Flower-stalks in forked pairs, longer than the leaf. Fruit awl-shaped. Native of the East Indies in shallow salt water. A tree about seven feet high. Leaves opposite, on short stalks, rather long, with round edges. Flowers composed of five or six thick, reflexed, white, slightly fragrant petals. Fruit very like that of the following species.

4. *R. Mangle*. Mangrove-tree. Linn. Sp. Pl. 684. Jacq. Amer. 141. t. 89. Browne Jam. 211.—Leaves pointed. Fruit slender-club-shaped. Found in moist situations, both in the East and West Indies. A tree about fifty feet high, with white wood, and a rusty-coloured bark. Leaves ovate, ribbed, entire, shining, coriaceous, dotted beneath. Stalks axillary, solitary, two or three-flowered, slightly triangular. Flowers white, having mostly eight petals.

Jacquín and Browne each give an elaborate and curious description of the fruit of this tree and the mode in which the seed germinates. From its growing usually near the sea, the lower branches frequently become a support to the American oyster, and this circumstance doubtless gave rise to an ancient fabulous opinion, that shell-fish sometimes grew on trees, like fruit.

5. *R. cylindrica*. Linn. Sp. Pl. 635. (Cari-Candel; Rheede Hort. Malab. v. 6. 59. t. 33.)—Fruit cylindrical, obtuse.—Native of salt marshes in Malabar. This species is closely allied to *gymnorhiza*, of which indeed Gærtner considers it to be a variety. It is rather taller, and not so much branched. Leaves much smaller, and on shorter stalks. Fruit green when young, but afterwards reddish-blue.

R. corniculata. See *ÆGICERAS*.

R. caesularis. See *SONNERATIA*.

We dare not venture to adopt *R. sexangula* of Loureiro, without further information than is furnished by that author respecting it.

RHIZUS, in *Ancient Geography*, a port of Cappadocia, near Trebizond, between the town of Pitiufa and the promontory of Athenæ. Ptolemy.

RHO, in *Geography*, a town of Italy, in the department of the Olona; eight miles W. of Milan.

RHOARA, in *Ancient Geography*, a town of Asia, in Parthia, between Casipraca and Semina. Ptolemy.

RHOAS, a river of the Colchide, according to Pliny.

RHOBASCI, a people of Scythia, on this side of the Imaus, placed by Ptolemy near the most easterly sources of the river Rha.

RHOBODUNUM, a town of Germany, upon the banks of the Danube, between Phelicia and Andupedum. Ptolemy.

RHOBODIUM, a promontory placed by Ptolemy in the northern part of Hibernia.

RHOBONDA, a town of Africa, in Mauritania Cæsariensis, between Tupufuptus and Aufum. Ptolemy.

RHOCAS, the watery eye. See *EPIPHORA*.

RHODA, or **RHODE**, *Rofas*, in *Ancient Geography*, a town of Hispania Anterior, belonging to the Indigetes, and

N. of a small gulf. It is said to have been built by the Rhodians on the banks of a small river which flowed from the Pyrenées, and called by Pomponius Mela "Thicis." But Cellarius conjectures that it was founded by the inhabitants of Emporiæ, who came thither from the town of Rhodes, in the island of that name.—Also, a town of Gallia Narbonensis, at the mouth and on the banks of the Rhone, according to Pliny; who adds, that it was built by the Rhodians. St. Jerome intimates that the Rhone took its name from this town.

RHODANNUS, or **RODANNUS**, a small river which had its source in the palatinate of Pomerania, and discharged itself into the Wittula at Dantzick.

RHODANUS FLUVIUS. See **RIIONE**.

RHODE, a river of the European Sarmatia, in the vicinity of the Axiaces. Pliny.

RHODE Island, in *Geography*, one of the United States of America, situated between 41° 17' and 42° N. lat. and between 71° 6' and 71° 52' W. long. Its north line is 29 miles long and its west line 49. The coast west of the bay measures 22 miles, the mouth of the bay 16, and the coast east of the bay 5, in all 43; while the greatest width measured on a parallel is 37 miles. Rhode island contains about 1580 square miles; of which about 190 are water, and about 90 are included in the islands. It is bounded N. and E. by the Massachusetts, S. by the Atlantic, and W. by Connecticut. It is divided, according to the following statement, into five counties and thirty-one townships.

Counties.	No. of Towns.	Population.			Chief Towns.
		1790.	1800.	1810.	
Providence	- 10	24,391	25,854	30,769	Providence.
Newport	- 7	14,300	14,845	16,294	Newport.
Washington	- 7	18,075	16,135	14,968	S. Kington.
Kent	- 4	8,848	8,487	9,834	Warwick.
Bristol	- 3	3,211	3,801	5,072	Bristol.
Totals	- 31	68,825	69,122	76,937	

This state sends two representatives to congress. The tribe of Indians who inhabited Rhode island at the time of its settlement, was the Narragansetts, who were a brave and powerful people. The first settlement in this state was made by Roger Williams, and a party of malecontents from Massachusetts, in 1635; and in 1643 a charter was obtained for the whole colony by sir Henry Vane. The charter, on which the present constitution is founded, was obtained of Charles II. in 1663. In May 1789, Rhode island adopted the federal constitution. The inhabitants of this state are chiefly of English descent. Agreeably to the charter just mentioned, the legislature is composed of a council of 12, including the governor and deputy governor, all chosen annually, and a house of representatives, consisting of deputies from the several towns, chosen twice a-year. There is one supreme court, which sits twice a-year in each county, and an inferior court of common pleas and general sessions of the peace for each county, sitting also twice a-year. The militia of this state amount to between 7000 and 8000 men, organized and disciplined in a manner similar to the rest of the New England militia. The settlement of Rhode island is said to have originated in a religious dispute; and some of its first settlers were exiles from the Massachusetts, on account of their religious opinions. The prejudice and animosity thus excited were never thoroughly removed; but they were long cherished by the descendants of the first occupiers; and even to this day, there has never been a congregational minister settled on the west side of the bay,

bay, except in Providence. The mass of the people, it is said, on the west side of the bay, has generally been ignorant, irreligious, and loose in their morals. The tone of religious sentiment and of morals, in Providence, Newport, and Bristol, and other towns adjoining these on the east of the bay, has been much raised by the emigrants from Massachusetts and Connecticut, and the establishment of religious institutions. The traveller sees few of the improvements in agriculture, roads, manufactures, or mode of living, which he finds in the neighbouring states; and meets with little of that civility for which other parts of New England are remarkable. The missionary labours, however, have not been without their good effects. With respect to the religious profession of this state, the Baptists are the most numerous; most of whom are Calvinistic; some are Arminians, and a few of them are seventh-day Baptists. A still smaller number consists of those who claim peculiar sanctity, and are denominated Separate Baptists. The other denominations are Congregationalists, who have eight ministers; Episcopians, who have four, one of whom is the bishop of the eastern diocese; Moravians, and Jews. In this state religion is not supported by law; but the clergy are maintained by the voluntary contributions of their people. The number of clergy, as they have no stated salary, enforced by law, is extremely small; but the state of religion and morals, in a great part of the state, is lamentably low. Literature has of late been encouraged. Brown university at Providence, deriving its present name from Nicholas Brown, esq., who gave the institution 5000 dollars, was founded in 1764 at Warren, and removed to Providence in 1770. (See COLLEGE.) Academies are established at Providence, Newport, Bristol, Warren, East-Greenwich, and South-Kingston. Schools are kept during the winter-months in most towns of the state, though not provided for by the laws; and upon the whole the state of society is improving. In this state there are 13 banks. The chief exports are flax-seed, lumber, horses, cattle, beef, pork, fish, poultry, onions, butter, cheese, barley, grain, spirits, and cotton and linen goods. More than 600 vessels enter and clear annually at the several ports. In 1804 the amount of exports was 1,735,671 dollars, and in 1810, 1,331,576 dollars. The imports consist of European and West India goods, and logwood from the bay of Honduras. The inhabitants, particularly those of Newport and Bristol, were, not long since, largely concerned in the slave trade, even in defiance of the laws of the state. A turnpike road passes from Providence, W.S.W., through Scituate and Coventry, meeting a similar road in Lisbon, Connecticut, which leads through Windham to Hartford; its length is about 25 miles. Another road strikes the Connecticut line S. of this, and passes through Norwich, New London, to New Haven and New York; this is the great southern road from Boston to New York; but the roads in this state have been much neglected. This state is reckoned as healthy as any country in America. The winters in the maritime parts of the state are milder than in the inland country; and the summers are delightful: the extreme heats that occur in other parts of America, being allayed by cool and refreshing breezes from the sea. The rivers and bays swarm with various kinds of fish; and this state produces corn, rye, barley, oats, and in some parts wheat, sufficient for home consumption, and the various sorts of grasses, fruits, and culinary roots and plants in great abundance and perfection. Cyder is made for exportation. The north-western parts of the state are rocky and barren, and of course thinly inhabited. The tract of land lying between North and South Kingston on the east, and Connecticut on the west, called "Shannock" country, or "Purchase," is excellent grazing

land, and inhabited by a number of wealthy farmers, who rear some of the finest neat cattle in New England; they keep large dairies, and make butter and cheese of the best quality, and in large quantities for exportation. Iron ore is found in great plenty in several parts of the state; so that the most considerable manufactures of this state are those of iron; and also abundance of lime-stone, which furnishes lime for exportation. In this state are several mineral springs; and one in particular near Providence, to which many people resort for bathing, and for drinking the water.

RHODE Island, is an island from which the American state takes its name, near the coast of Massachusetts, about 40 miles S.W. from Boston. It is about 15 miles from N. to S., and on an average $3\frac{1}{2}$ miles wide, and is divided into three townships, viz. Newport, Portsmouth, and Middletown. This island is pleasant and salubrious, and is a noted place of resort for invalids from southern climates. Between 30,000 and 40,000 sheep are fed on the island, besides neat cattle and horses. N. lat. $41^{\circ} 25'$. W. long. $71^{\circ} 20'$.

RHODE River, the westernmost water of the N.W. branch of Cape Fear river, in North Carolina.

RHODEN, a town of Germany, in the county of Waldeck; 24 miles N.N.W. of Waldeck.

RHODES, Island of, in *Ancient and Modern Geography*, an island of Asia, situated in the Mediterranean, very near the coast of Caria or Natolia, and N.E. of the island of Crete, but much larger than this island. Pliny states its circuit at 125 miles; but Isidore makes it 103 miles. According to Sonnini, it is much longer than it is broad; its greatest length, in a direction from N. to S., being about 12 leagues, and breadth 6; and its circuit is commonly estimated at 44 leagues. Its form is nearly triangular, whence it obtained the name of "Trinacria;" and it was also known formerly by the names of Ophiusa, Aleria, Æthrea, Cerymbia, Poessa, Atabyria, Marcia, Oloessa, Stadia, Telchinis, Pelagia, and Rhodus. The latter appellation has prevailed in later ages; and its etymology has been sought in the Greek Rhodon, signifying a rose, with which flower the island abounded. In confirmation of this etymology it has been alleged that several Rhodian coins are still extant, exhibiting, on one side, the sun, and on the reverse a rose. Diodorus Siculus deduces the origin of its name from Rhoda, the daughter of Apollo by Venus. Others, however, have preferred the etymology of Bochart, who, availing himself of one of its ancient names, viz. Ophiusa or Snake island, given to it on account of the numerous snakes with which it was infested, when it was first inhabited, says that the Phœnicians also called it Snake island, which, in their language, signified "Gesirat Rhod," the latter word meaning a snake, whence the Greeks afterwards formed the name of Rhodes, which the island has since preserved. Another name by which it was distinguished, in common with the island of Cyprus, was Macaria, or fortunate, referring to the nature of the climate and of the soil. But it is said to surpass Cyprus, if not with respect to the fertility of the land, at least by its milder and more agreeable temperature. In this island the heat is not excessive, so that long droughts do not burn the plants, dry up the waters, or cause the inhabitants to suffer. The fertility and productiveness of its soil gave occasion to the fable, embellished by the poets, of those golden showers which they pretended to have once fallen upon it. It formerly produced, in great plenty, all sorts of delicious fruits, and wines of so exquisite a flavour, that they were used by the Romans chiefly in their sacrifices, and thought to be, as Virgil informs us, (Georg. l. ii.) too good for mortals. Although the heat is not scorching, yet the air is so serene, that no day ever passes without sun-shine; whence the poets feigned Phœbus

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to be in love with this island, which, as they say, was a mere marsh, altogether uninhabitable, till it was loved by Phœbus and raised out of the waters by his powerful influence. To this purpose Sonnini describes its temperate climate, pure air, and fine springs, which at all times supply the wants of its inhabitants, and render it agreeable; its vallies of a rich and fertile soil, covered by plentiful harvests, and clothed with rich pastures, shaded by trees bearing precious fruits, such as the olive, the orange, and the fig-tree, with flowers that embellish with their lustre, and perfume with their sweet emanations; sloping hills on which the vine is cultivated, or which present to numerous flocks a luxuriant and odoriferous herbage; mountains on which grow the most beautiful trees, whose verdure is perennial; all which would still render it one of the most delightful abodes in the world, did not the iron hand of the Turks efface a part of the colours of this smiling picture. A gloomy nakedness, says the same author, diffuses melancholy over places formerly adorned by the riches of nature and industry; and the men who are called thither by an agreeable and truly happy country, are driven back by the terror inspired by a horde of spoilers. Happiness no longer inhabits an island formerly "fortunate," and the golden shower, which the poets of antiquity caused to fall there, as an emblem of its riches and brilliant advantages, is converted into a storm of desolation.

In the time of Homer the island of Rhodes had three cities, *viz.* Lindus, now *Lindo*, Camirus or *Camiro*, and *Ialyfus*, the most ancient city in the whole island; to which in after ages was added a fourth, bearing the name of the island. (See each respectively.) These three cities were built, according to Diodorus, by Tlepolemus, the son of Hercules, before the Trojan war. But Strabo and Cicero inform us, that they were founded by the Heliades, or grandsons of Phœbus, Ialyfus, Camirus, and Lindus, who gave each of them his own name. Other writers say, that they were built by the Dorians not long after their migration; and hence Athenæus reckons them among the Dorian colonies. Herodotus says, they were founded by the daughters of Danaus, who landed in this island, after having put to death the sons of Ægyptus, their husbands. In the city of Lindus was a magnificent temple, built, according to Plutarch, in honour of the Lidian Minerva, a statue of which, together with the mother of Jupiter Dodonæus, both of exquisite workmanship, were found in the rubbish of the city, after it had been accidentally reduced to ashes, and removed to Constantinople. In this temple there were also several pictures by Parrhasius, Zeuxis, and other great masters. Lindus and Ialyfus were well fortified in the time of the Peloponnesian war, as we learn from Thucydides; but Camirus was without walls. The three cities now mentioned were, as Strabo informs us, three different republics, independent of each other, governed by their own laws, till the inhabitants abandoned them, and removed to the city of Rhodes.

This island was first peopled, according to Diodorus Siculus, by the Telchinæ from Crete; but dreading a deluge, they abandoned their habitations, and made way for the Heliades, or grand-children of Phœbus, who took possession of it, after Apollo had cleared it of the mud, with which it had been covered by the deluge. The Heliades, being infested with serpents, sent for Phorbos from Thessaly, upon the suggestion of the oracle at Delos, who brought with him a number of Thessalians, settled on the island, destroyed the serpents, and after his death was honoured as a demi-god. A colony of Cretans afterwards settled at Camirus, in this island, under the conduct of Althæmenes, son of Catreus, king of Crete; and by direction of the oracle,

he was honoured after his death as a hero or demi-god. Not long before the Trojan war, Tlepolemus, the son of Hercules, in compliance with the instruction of the oracle, which he consulted, left Argos, and settled in Rhodes. He here planted a colony, which he governed as king of the island with great equity. Diodorus says, these were the first inhabitants of Rhodes. After the Trojan war, the best part of the island was taken possession of by the Dorians, who expelled the ancient proprietors, and the Doric dialect was commonly used throughout the whole island.

The Rhodians applied themselves, at an early period, to trade and navigation, and for many ages were sovereigns of the sea: their laws being the standard by which all controversies relating to maritime affairs were decided. These laws and constitutions were so just, that they were afterwards incorporated into the Roman pandects, and followed in all the provinces of the Roman empire.

The government of Rhodes was originally monarchical; and several kings are said to have reigned there long before the Trojan war; but of these we have no account. Among the eminent writers of this island, we have an enumeration of the following, whose names we can only mention: *viz.* Aristophanes, Eudemus, Hieronymus, a Peripatetic philosopher, Leonidas, Pisander, Panetius, Apollonius Molon, Timocreon, Præciphanes, Anthæas, &c. The authors of the Universal History (*ubi infra*) have given a brief account of some of them, and referred for an ampler detail to Meursius's learned treatise on the island of Rhodes, printed at Amsterdam in 1675, and published with those on Crete and Cyprus by the same author.

In the time of the Trojan war, and after that epoch, the kings who reigned in this island were, Tlepolemus, Dorieus, Damagetus, Diagoras, Evagoras, Cleobulus, Erasitides, Damagetus II., and Diagoras II. The last of these sovereigns proved conqueror in the Olympic, Isthmian, Nemean, and Argian games, and on that account is celebrated by Pindar. His three sons were also victors in the Olympic sports. Upon the death of Diagoras II. some extraordinary revolution must have happened; as another family had possession of the throne. After the death or expulsion of the last king, the republican government prevailed over the whole island; during which the Rhodians engaged in trade and navigation, became very powerful by sea, and planted several colonies in distant countries; *viz.* Rhodus in Spain, and Parthenope in the country of the Opici. At this time they were masters of the Balearic islands, then called the Gymnasian islands. During the Peloponnesian war the Rhodians first joined the Athenians, revolted from them to the Lacedæmonians, and afterwards joined the former. At this time the republic of Rhodes was rent into two factions, the people favouring the Athenians, and the nobles the Lacedæmonians; but the latter at last prevailed; democracy was abolished, and an aristocracy introduced in its room. Under this form of government the state enjoyed a profound tranquillity, until the third year of the 105th olympiad, which was the third year of the reign of Philip the son of Amyntas, when the Social war broke out, which, after it had lasted five years, was concluded by a treaty, very little to the honour of Athens. By this treaty, Rhodes, Chios, Cos, and Byzantium, were to enjoy full liberty, and be quite independent of Athens. The Rhodians, however, did not remain long unmolested; but they were oppressed by Mausolus, king of Caria, who had assisted them in throwing off the Athenian yoke. After suffering for some time, they equipped a fleet, invaded Caria, and regained their liberty. Artemisia, the queen of Mausolus, by an act of treachery, possessed herself of the city of Rhodes, and put to death the chief citizens

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citizens who had planned the Carian expedition. In this state of distress, the Rhodians resorted to the Athenians, and either by their assistance, or by exertions on their own part, after the death of Artemisia, were restored to their ancient liberty. From this time till the reign of Alexander the Great the Rhodians enjoyed undisturbed tranquillity; and as they delivered their cities and harbours to his custody, they were on that account highly favoured by that prince. Diodorus indeed tells us, that Alexander deposited his last will in the archives of the city of Rhodes, and shewed, on all occasions, a greater value for the Rhodians than for any other of the Greek nations. But they no sooner had heard of his death, than, taking up arms, they drove out the Macedonian garrisons, and once more became a free people. About this time Rhodes, the capital city, suffered very much from an inundation, accompanied by a tempest and hailstones of an extraordinary size, which demolished many houses, and killed a great number of the inhabitants. The Rhodians soon repaired the damage which they had sustained, by a renewed and very sedulous application to trade and navigation, the only sources of their wealth and power. Although they were in amity with the neighbouring princes, and were desirous of observing a strict neutrality, by which prudential caution they were become one of the most opulent states of Asia; yet their inclination, concurring with their interest, they secretly attached themselves to Ptolemy: the most advantageous branches of their commerce springing from Egypt. When Antigonus, who had engaged in a war with Ptolemy for the island of Cyprus, demanded succours of them, and they hesitated in declaring against their ancient friend and ally, his anger was excited, and he immediately ordered one of his admirals to sail with his fleet to Rhodes, and seize all the ships that sailed out of the harbour for Egypt. The Rhodians, finding their harbour blocked up by the fleet of Antigonus, equipped a great number of galleys, attacked the enemy, and obliged him, with the loss of many ships, to quit his station; Antigonus was incensed, and threatened to besiege their capital with his whole army. They remonstrated, but with little effect, and the only terms of accommodation they could obtain, were, that they should declare war against Ptolemy, that they should admit Antigonus's fleet into their harbour, and that 100 of their chief citizens should be surrendered as hostages for the performance of these articles. The Rhodians applied to their allies, and particularly to Ptolemy, for assistance; and after great preparations on both sides, Demetrius put himself at the head of a large body of troops, increased by pirates and mercenaries, who wished to plunder Rhodes of its riches, and having laid waste the country round the city, approached the city itself with his powerful forces, and fortified his camp with strong ramparts and a triple palisade. The Rhodians adopted every possible measure for a vigorous defence. After repeated assaults on the part of Demetrius, which were repelled with great slaughter, he brought forward a newly invented machine, called "helepolis," with a variety of other engines, and he employed in the management of them about 30,000 men. The besieged, in the mean while, raised a new wall, within that which the enemy intended to batter with the helepolis. The city was furiously assaulted on all sides, both by sea and land; and an honourable capitulation on the part of the Rhodians being refused by Demetrius, the attack was renewed, and a breach made in the wall; but the besieged fought in the breach with such intrepidity, that the enemy, after several unsuccessful attempts, were forced to abandon the enterprise and retire. A seasonable supply of provisions arriving safe at Rhodes, the besieged gained new courage, and determined to set fire to the enemy's engines.

In the execution of this project a great number of Demetrius's troops fell victims, and the conflagration was so great, that Demetrius thought it most prudent to move off his machines, lest they should be utterly destroyed. Whilst the Rhodians were thus, with equal valour and perseverance, defending themselves and annoying the enemy, an embassy arrived at the camp of Demetrius from Athens, and the other cities of Greece, soliciting him to make peace with the Rhodians. A cessation of arms was agreed upon, and terms were offered by Demetrius, which were rejected by the Rhodians. The assault was renewed, and a breach having been made, it was entered by a detachment of Demetrius's men; which occasioned great confusion in the city: but the Rhodians fought like men in the utmost despair, and animated by their leaders, who encouraged one another, they proposed a last effort for the defence of their city and country, which was that of breaking into the very centre of the enemy's battalion, in the execution of which measure they killed both their commanders. After their death, the rest were easily thrown into disorder, and all to a man were either killed, or taken prisoners. The Rhodians also, on this occasion, lost many of their bravest commanders. At length the helepolis was rendered useless, by the stratagem of a Rhodian engineer, and this misfortune, it is said, induced Demetrius to conclude a peace. Thus the siege, after it had continued a whole year, was raised (B.C. 303); and the Rhodians amply rewarded all those who had distinguished themselves in the defence of their country. One instance of laudable conduct on the part of Demetrius during the siege deserves to be recorded. At this time Protogenes, a celebrated painter, who was a native of Cannus, a city of Caria, resided at Rhodes. His house was in the suburbs; and he could not be prevailed upon to quit it. The prince, surpris'd at this resolution, asked him why he did not, like the other inhabitants, secure himself within the walls? Protogenes replied, that he was under no apprehension, since he was sensible that Demetrius had declared war against the Rhodians, and not against the arts. The prince was so pleased, that he took the painter under his protection, and placed a guard round his house, to preserve him from the insults of the soldiery. The chef-d'œuvre of this Protogenes was the picture of Ialysus, supposed by the Rhodians to have founded their city. The Rhodians having concluded a peace upon advantageous and honourable terms, devoted themselves again to trade and navigation; by which they not only became masters of the sea, but the most opulent and flourishing state of all Greece. Their next war was with the Byzantines; and about the time of its termination the famous Colossus of Rhodes was overturned by an earthquake, which did other considerable damage. In the year B.C. 203, the Rhodians joined Attalus, king of Pergamus, against Philip, king of Macedon; and a triple alliance was formed between the Romans, Attalus, and the Rhodians. In process of time, the fidelity of the attachment of the Rhodians to the Romans, of which they had once and again exhibited unequivocal evidence, was suspected; and this suspicion was confirmed when they engaged with Perseus, the son of Philip, to stand neuter. The Roman senate was incensed, and the Rhodians sent messengers to appease their wrath, but their efforts were unavailing. At length, however, in the year B.C. 166, they were admitted to an alliance with Rome and favoured by the senate. From this period, to the breaking out of the Mithridatic war, the Rhodians enjoyed their liberties, while all the other states and colonies of Greece were brought under the Roman yoke, and became provinces of that republic. In the civil war between Cæsar and Pompey, they assisted the latter with a numerous fleet; but after the death of Pompey they

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they sided with Cæsar, which drew upon them the displeasure of C. Cassius, who advanced to their island with a powerful fleet, and demanded the surrender of their fleet, with which demand they refused to comply. The consequence was a sea-engagement, in which the Rhodians were defeated; and it has been observed, that this was the first time in which they were fairly overcome in a sea-fight. Cassius proceeded to take possession of Rhodes and to plunder it. He also ordered fifty of the chief citizens to be put to death, and others were proscribed. He stripped them of all their money, and even the temples of all their valuable furniture, vessels and statues. He announced, by a public cryer, that any person who should discover any hidden treasures should receive a tenth part by way of recompence; and the result was, that he thus extorted from private persons above 8000 talents. He then fined the city in 500 more, and leaving L. Varus, with a strong garrison to exact the fine, without any abatement, he returned to the continent.

After the death of Cassius, Marc Antony restored the Rhodians to their ancient rights and privileges, bestowing upon them the islands of Andros, Naxos, Tenos, and the city of Myndus. But these the Rhodians so oppressed and loaded with taxes, that Antony, though a great friend to the Rhodian republic, was obliged to divest her of the sovereignty over those places, which he had, a little before, so liberally bestowed upon her. From this time to the reign of the emperor Claudius, we find no mention made of the Rhodians. That prince deprived them of their liberty for having crucified some Roman citizens. However, he soon restored them to their former condition, as we read in Suetonius and Tacitus. The latter adds, that they had been as often deprived of, as restored to, their liberty, by way of punishment or reward for their different behaviour, as they had obliged the Romans with their assistance in foreign wars, or provoked them with their seditions at home. Pliny, who wrote in the beginning of Vespasian's reign, styles Rhodes a beautiful and free town. But this liberty they did not long enjoy, the island being soon after reduced, by the same Vespasian, to a Roman province, and obliged to pay a yearly tribute to their new masters. This province was called the province of the islands. The Roman prætor, who governed it, resided at Rhodes, as the chief city under his jurisdiction; and Rome, notwithstanding the eminent services rendered her by this republic, thenceforth treated the Rhodians not as allies but vassals.

Under Constantine this island remained part of the Eastern empire; but the pusillanimity and vices of the princes who succeeded, shook it to its foundation. In the twelfth year of the reign of Constant, Moawiah, Othman's lieutenant, made himself master of Rhodes. At length the Greek emperors expelled the Mahometans, and kept possession till the time of Baldwin, who, having made himself sovereign of Constantinople, sent a præfect to Rhodes. Some time after it was conquered by Ducas. Then the brave warriors, known by the name of the knights of St. John, attacked, and, after a bloody battle, took it; in which heroism triumphed over numbers and valour. Mahomet II. tarnished the lustre of his laurels, by besieging this place, defended by a small band of heroes. In the year 1523, Soliman saw a numerous army perishing under its walls; and if this redoubtable conqueror of Hungary and Persia did at length subdue Rhodes, attacked on all sides by the forces of the Turks, the greater was the shame of the Christian princes, who did not send a single vessel to the aid of its intrepid defenders. Destroyed, rather than vanquished, they were almost buried under the ruin of their forts. Soliman could not enter the town without wading through the blood of his soldiers; and in it he found nothing but heaps of

ruins, defended by a small company of knights, covered with wounds, who afterwards removed to Malta. (See MALTA). The governor-general of this island is a pacha, who has absolute power. The Greeks and Jews have a chief, named the Moutevali, who is their intendant-general, and has the regulation of the tax, called carach,—a capitation tax imposed by the grand seignior on all his subjects who are not Mahometans, but is paid only by the men.

The soil of the island is dry and sandy, but watered by its numerous springs. It is very fertile; corn thrives well; and its yellow and heavy grain affords flour as white as snow, which makes excellent bread. It needs only cultivation to raise an ample supply, not only for its own consumption, but for a large exportation. The number of families in the whole island is estimated at 4700 Turks, 2500 Greeks, and 100 Jews, in all 7300, or about 36,000 inhabitants. N. lat. 36° 26'. E. long. 27° 32'.

RHODES, the capital city of the island above described, as well as the chief seat of its government, is situated to the N.E. of the island, at the foot of a hill of gentle ascent, and in an agreeable plain, environed at some distance with several hills full of springs, and covered with all kinds of fruit-trees. This stately city was built by the same architect whom the Athenians had employed in building the Piræus, or part of Athens; viz. Hippodamus, a native of Miletus, and esteemed one of the best architects Greece ever produced. It was built, according to Strabo and Aristides, in the form of an amphitheatre, surrounded with walls like those of Munichia, embellished with most stately buildings, straight and broad streets, pleasant avenues, fine groves, large squares, &c. Dio Chryostom says, that most of the Pagan deities had temples in this city; among which that of the Sun, called by the Dorians Halcium, was one of the most noble structures of antiquity. Strabo mentions the temple of Bacchus, enriched with a great number of pictures by Protogenes. Hefychius, Appian, and Suetonius, speak of the temples of Isis, of Ocrian, and Diana, as master-pieces of art. Each of these temples contained immense treasures, the offerings of votaries from all parts of Greece, Asia, and Italy. In the Dionysium, or temple of Bacchus, was a statue of Pluto of massy gold, and an incredible number of other statues and pictures. Pliny informs us, that, in his time, there were in the city of Rhodes above 3000 statues, most of them executed with great taste; and Aristides says, that there were more valuable statues and pictures in this single city than in all the other cities of Greece. The pictures of Menander, king of Caria, and of Anæus, the son of Neptune, by Apelles, and those of Perseus, Hercules, and Meleager, by Xeuxis, are highly extolled by Pliny, and other ancient writers. That of Meleager was there scorched by lightning, as Pliny tells us, but that accident did not in the least deaden the lustre and brightness of its colour.

In the Roman times this city was famous for the study of all sciences, and resorted to by such of the Romans as were desirous of improving themselves in literature; some of the ancients representing it as equal to Athens itself. It had a very convenient harbour, at the entrance of which were two rocks; and on these rocks, though 50 feet asunder, the famous colossus is supposed to have stood. See COLOSSUS.

The city of Rhodes is still a place of considerable note; being pleasantly situated on the side of a hill, three miles in compass, and fortified with a treble wall; but its ramparts partake of the same neglect and decay of every thing that is in the possession of the Turks. The streets are wide, straight, and well paved; and the houses built after the Italian taste. The chief haven is now very different from what it is said to have been in its ancient state. It is now longer

longer that basin, whose deep waters afforded a commodious shelter to ships of every size; nor are the quays enlivened by the activity of a flourishing trade. It is now little frequented except by Greek boats, and by a few merchant vessels which put in there; it is half choked up, and ships of war are obliged to cast anchor without, where they are but indifferently protected from the winds and waves by some points of land and some shoals. The entrance of the harbour is defended, on the one side, by a square tower, constructed by a grand master of the order; inscriptions and other marks recall to mind the period of its foundation. The Turks still call it St. John's tower, although the Greeks have changed this name into that of St. Nicholas, more generally adopted in the Levant. On the other side is a tower, not so high, nor so strong, which is named St. Angelo's or St. Michael's tower. The harbour is as if divided into two by a small mole, which projects within it, and forms an inclosure, into which boats alone can enter, and which, on that account, is called Boat harbour. Independently of the large harbour, there was another on each side; the one was the harbour for galleys, where they can no longer enter at this day; the other is choked up, and almost entirely dry. Every thing, says Sonnini, is destroyed; every thing is annihilated under a government, which knows only to enjoy, or rather to abuse the present, and to which the most simple calculations of foresight are unknown. Yards for shipbuilding, which might, with so much reason, be called workshops of dilapidation, are established at Rhodes for the Ottoman navy; the timber is brought from the fine and vast forests of Caramania, and even from those of the island. But the construction of ships is so slow, and the timber so injudiciously selected, that they are sometimes half-rotten before they are entirely finished.

In several places of the city of Rhodes are still to be seen marks of the ancient possession of the order of St. John of Jerusalem; a long street preserves the name of Rue des Chevaliers; it is perfectly straight, and formed of old houses, in which remain the armorial bearings of the members of the order. The ancient church of St. John is become the principal mosque; the hospital has been transformed into public granaries; and the palace of the grand master, falling into ruins, is almost entirely deserted. N. lat. $36^{\circ} 25'$. E. long. $27^{\circ} 45'$.

RHODES, a town of Africa, in the kingdom of Tunis, situated on an eminence, between the lake of Tunis and the sea, at a distance from some hills, where Hanno was defeated by Regulus.

RHODES, *Colossus of*. See COLOSSUS.

RHODES, *Straits of*. See MALTA.

RHODEZ. See RODÉS.

RHODIA, in *Botany*. See RHODIOLA.

RHODIGINUS, CÆLIUS, in *Biography*, a learned Italian, whose proper name was Ludovico Celio Richeri, was born at Rovigo about the year 1450. He studied at Ferrara and Padua, and then travelled into France, in which country he resided a considerable time. On returning to Italy, he filled the office of public professor in his native place from 1491 to 1497, and again obtained the same appointment in 1503; after this he opened a school at Vicenza, where he continued till 1508, when he was invited to Ferrara by duke Alfonso I. In the year 1515, Francis I. nominated him to the chair of Greek and Latin eloquence in Milan, as successor to Demetrius Chalcondylas. He returned in 1521 to Padua, and in 1523 he was re-admitted to the council of his native city, and deputed from it to Venice, to congratulate the new doge. So great was his loyalty, or his gratitude, that, in 1525, he died of grief, on account of the defeat and capture of Francis at the battle

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of Pavia. He was author of various works; of these, the principal is entitled "Antiquæ Læctiones," of which he published sixteen books, and fourteen more were added after his death. It was printed at Basil in 1566, and again at Franckfort in 1666. It has been characterised as a miscellany of profound erudition, in which abstruse words in Greek and Latin are explained, obscure passages in the best authors are elucidated, and corrupt ones rectified; recondite histories and ancient rites are narrated, and many arcana of the deepest philosophy, especially of the Platonic school, are brought to light; "whence," says the learned Vossius, "I am often moved with wonder, and indeed with indignation, in observing that the precious labours of such a man are so little in the hands of the youth of the present time." By Julius Scaliger he was denominated "the Varro of the age." Gen. Biog.

RHODIOLA, in *Botany*, from ῥόδον, a rose, because the root of this plant, when dried, has a rose-like smell. RHODIOLA is literally the diminutive of RHODIA, a name applied by ancient writers to the wood or root of some plant (suspected by Linnæus to be a *Convolvulus*) possessing a similar fragrant property.—Rose-Root.—Linn. Gen. 526. Schreb. 693. Willd. Sp. Pl. v. 4. 807. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 1082. Ait. Hort. Kew. v. 5. 397. Juss. 307. Lamarek Illustr. t. 819.—Class and order, *Diocia Obandria*. Nat. Ord. *Succulente*, Linn. *Sempervivæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth inferior, four-cleft, concave, erect, obtuse, permanent. *Cor.* Petals four, oblong, obtuse, erect, spreading, twice as long as the calyx, deciduous. Nectaries four, erect, emarginate, shorter than the calyx. *Stam.* Filaments eight, awl-shaped, longer than the corolla; anthers simple. *Pist.* Germens four, superior, oblong, acuminate; styles and stigmas obsolete. *Peria.* abortive. *Seeds* none.

Female, *Cal.* Perianth as in the male. *Cor.* Petals four, generally imperfect, of a coarse texture, erect, obtuse, equal with the calyx, permanent. Nectaries as in the male. *Pist.* Germens four, superior, oblong, acuminate, ending in simple, straight styles; stigmas obtuse. *Peric.* Capsules four, corniculate, opening inwardly. *Seeds* numerous, roundish.

Obf. Schreber says (in his Appendix, 839), that professor Dahl having seen specimens of RHODIOLA with perfect flowers, viz. with ten stamens and five pistils, the genus should properly be united to SEDUM. Linnæus, however, in his *Flora Lapponica*, mentions a specimen found in Lapland with perfect flowers; but, at the same time, he tells us, that such flowers are barren, none being fertile, except those true female flowers, on a separate plant, which have no stamens, and but imperfect petals. Hence it appears, that the present plant is truly dioecious in habit, although it may occasionally incline to the perfect structure of SEDUM.

Ess. Ch. Male, Calyx in four parts. Petals four. Nectaries four, notched.—Female, Calyx and nectaries like the male, but somewhat smaller. Petals of a coarse texture. Capsules four, many-seeded.

1. *R. rosea*. Rose-root. Linn. Sp. Pl. 1465. Engl. Bot. t. 508. Fl. Dan. t. 183.—Found in the clefts of Alpine rocks, and sometimes on rocks by the sea-shore, in different parts of Great Britain; flowering in May and June.—*Root* perennial, fleshy, white or greyish, when dried emitting a fragrance like that of rose-water. *Stems* perfectly simple, erect, a span high, thickly beset with leaves. *Leaves* imbricated, sessile, obovate, acute, fleshy, glaucous, smooth, toothed towards the top, in the male tipped with red. *Cyme* terminal, sessile, much branched, composed of numerous yellow flowers, the female ones dotted with red.

—It should be remarked, that the odour of the root is greatly impaired by culture.

Miller cultivated a variety of this plant for many years at Chelsea, which was smaller in all its parts, and had purplish flowers.

We can by no means admit *Rhodiola biternata*, Loureir. Cochinch. 627, because that author had never seen the female flowers; and his description of its twining stem, and doubly-compound leaves, renders it in habit so totally unlike the original *Rhodiola*.

RHODIOLA, in *Gardening*, comprises a plant of the low herbaceous, odoriferous, succulent, perennial kind, of which the species cultivated is the common, or yellow rosewort (*R. rosea*).

Of which there is a variety, in which the roots are smaller; the stalks small, and not above five inches long; the leaves small, ending with a purple point; the petals are purplish, and the stamens little longer than the petals. It flowers later than the common sort.

Method of Culture.—This plant may be increased by planting cuttings of the stalks in the beginning of April, soon after they come out from the head, in a shady border; covering them close down with a glass, and keeping them dry, when they mostly put out roots in about six weeks; but the cuttings should be laid in a dry room at least a week before they are planted out, otherwise they are apt to rot and be destroyed. They may also be raised by parting the roots in the beginning of autumn, when the stalks begin to decay; and when the fleshy parts are cut or broken, they should be laid to dry a few days before they are planted. They require a shady situation, and a dry undunged soil, in which they will continue many years. They afford variety in the borders, clumps, &c.

RHODITES LAPIS, the *Rose-stone*, in *Natural History*, the name given by authors to a kind of astroites, or star-stone, in which the figures more represent roses than stars; they are in both owing to coralloide bodies immersed in the stone; which, according to their various species, afford a different figure, when cut transversely, in cutting the stone into plates for use.

RHODIUM, in *Chemistry*, a new metal, found in crude platina, so called from the rose-colour of a dilute solution of the salts containing it, by Dr. Wollaston, to whose inquiries we are indebted for proof of its existence, and an account of its properties. This metal is thus procured: some crude platina being digested in moderately dilute nitro-muriatic acid, a brownish-red solution is obtained; from this the platina is to be separated, for the most part, by muriate of ammonia, and the residual liquor is to be heated with zinc; by this treatment a black powder will be obtained, and the supernatant fluid will consist of the muriates of zinc and iron. This black powder, by digestion in very dilute nitric acid, will be freed from the copper and lead which it usually contains, and the residue is to be digested in dilute nitro-muriatic acid, till every thing soluble is taken up. To this solution a little common salt is to be added, and the whole evaporated to dryness; after which, by repeatedly washing with warm alcohol, the soda-muriates of platina and palladium will be dissolved, leaving behind a pure soda-muriate of rhodium.

This salt is readily soluble in hot water, and deposits on cooling rhomboidal crystals of a bright rose-colour. Sal ammoniac occasions no turbidness in the solution; but if a few drops of muriate of platina are added to the mixture, an immediate yellow precipitate is thrown down. Neither prussiat of potash, nor hydro-sulphuret of ammonia, nor the carbonated alkalies, produce any precipitate; but the pure alkalies throw down a yellow oxyd, soluble either in alkalies or acids. The muriate of this metal is an uncrystallizable

salt of a rose-colour, and soluble in alcohol; with nitre, or the muriates of ammonia or soda, are formed crystallizable triple salts insoluble in alcohol.

Nitrate of rhodium is also uncrystallizable. It appears not to be decomposable by silver, but is so by copper, mercury, and most of the other metals.

The soda-muriate of this metal affords a black powder by digestion with zinc; which, when heated with borax, acquires a white metallic lustre, but is infusible by any heat that has hitherto been applied. It is, however, fusible, either with arsenic or sulphur, and may be again separated from those substances by heat, but it does not acquire by this treatment any degree of malleability. It combines with most metals, and with silver and gold forms very malleable alloys, which are unaltered by a high heat, but become encrusted with a black oxyd when slowly cooled; an alloy of six parts of gold and one of rhodium differs but little in colour from fine gold, but is much more difficultly fusible. The specific gravity of rhodium appears to be somewhat more than 11. That of an alloy consisting of one part rhodium and about two parts lead, was 11.3; which is so nearly that of lead itself, that each part of this compound may be considered as having about the same specific gravity. Phil. Transf. for 1804, vol. xciv. pt. 2. See PALLADIUM and PLATINA.

RHODIUM Lignum. See ASPATH.

RHODIUM Marmor, a name given by the ancients to a marble brought from Rhodes; it was a good white, but inferior to the Parian, and was used by the Romans in their public buildings, and sometimes in statuary.

RHODIUS, in *Geography*, a river of European Turkey, which takes its source N.E. of mount Ida; and after receiving some rivulets which flow from the neighbouring mountains, and traversing a space of twelve or fifteen miles, discharges itself into the Hellespont, by the side of the castle of Dardanelles. Its waters, which are far from being abundant in summer, are kept back and employed in the irrigation of the lands; but in winter, swelled by the rains which are frequent in that season, it occupies a bed sufficiently large to deserve the name of river. The inhabitants of the Dardanelles, built on its banks, have constructed a wooden bridge, at some distance from its mouth, in order to be able to cross at all times to the left bank, and repair to the fields which they cultivate beyond it. Behind the castle, between the town and the river, is a tolerably extensive walk, naturally turfed, and shaded by very tall plane-trees. This river waters an extremely fertile valley, formed by a plain to the east of the town. In this town are reckoned scarcely 4000 inhabitants, Greeks, Mussulmans, and Jews. Its position is agreeable, its territory is fertile, and its productions are very diversified. To the N.E. is a rising ground, covered with vines; and at the extremity of the fore-mentioned valley are found indications of a volcano; among others are to be seen considerable blocks of granite, the quartzose part of which is almost converted into glass. A little farther on is a fertile and circular bottom of small extent, surrounded by mountains covered with wood.

In the territory of the Dardanelles are cultivated cotton, sesamum, various kitchen-garden plants, the vine, the olive-tree, and several species of fruit-trees. The orange-trees begin to grow here in the open air; and a tolerable large quantity of grain is collected here. The neighbouring mountain furnish the "velanida," (see *QUERCUS Ægilops*.) and gall-nut used in trade. Olivier.

RHODIUS, in *Ichthyology*, the *ACIPENSER Sturio*. See STURGEON.

RHODODENDRA, in *Botany*, a natural order of plants, named after its principal genus, (see the next article,) and

and constituting the fiftieth in Jussieu's series, or the second of his ninth class; for the characters of which class see ERICÆ and GUAJACANÆ. The following are the marks of the order in question.

Calyx divided, permanent. *Corolla* inserted into the bottom of the calyx; sometimes of one petal, and lobed; sometimes almost polypetalous, the limb being so very deeply divided. *Stamens* definite, distinct; in the monopetalous genera inserted into the corolla; in the rest into the base of the calyx. *Germen* superior; style one; stigma simple, often capitate. *Capsule* superior, of several cells, and several valves, both margins of each valve inflexed, and connected with the central axis, (or *columella*), so that each forms a cell, containing numerous minute seeds. *Stem* shrubby, more or less lofty. *Leaves* alternate, or more rarely opposite; the young ones, in many instances, revolute at the margin.

Section 1. *Corolla monopetalous.*

Kalmia, *Rhododendrum*, and *Azalea*; all Linnæan genera; to which is to be added MENZIESIA; see that article.

Seçt. 2. *Corolla imperfectly polypetalous.*

Rhodora, *Ledum*, *Befaria*, (now more correctly written *Bejaria*, by Ventenat and others; the Spaniards having pointed out the error, which originated in a mistake of Linnæus, in reading Mutis's manuscript,) and *Itea*; all likewise Linnæan genera.

Jussieu considers the *Rhododendra* as essentially distinguished from his *Ericæ*, by the want of horns to the anthers, and especially by the inflexed margins of the valves of the capsule. It does not appear to us that these characters are, either of them, strictly absolute. Mr. Salisbury has long ago observed, that the leaves of the *Rhododendra* have always a remarkable glandular tip.

RHODODENDRUM, from ῥόδον, a rose, and δένδρον, a tree, a name adopted by Linnæus from Dioscorides, whose ῥόδονδένδρον however is but a synonym to his νερίον, our Nerium, or Rose-bay; the ῥόδονδένδρον of the modern Greeks.—Linn. Gen. 218. Schreb. 294. Willd. Sp. Pl. v. 2. 603. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 49. Pursh v. 1. 297. Juss. 158. Lamarck Illustr. t. 364. Gært. t. 63.—Class and order, *Decandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juss.

Gen. Ch. *Cal.* Perianth inferior, in five deep segments, permanent. *Cor.* of one petal, widely funnel-shaped; its limb spreading, with five rounded unequal segments. *Stam.* Filaments ten, thread-shaped, about the length of the corolla, declining; anthers incumbent, oval, abrupt, of two cells, opening by two terminal pores. *Pist.* Germen with five angles, abrupt; style thread-shaped, the length of the corolla; stigma obtuse. *Peric.* Capsule ovate, somewhat angular, of five or ten cells, formed by the inflexed margins of the valves, which finally separate from the five or ten-angled central column. *Seeds* numerous, minute.

Ess. Ch. *Calyx* inferior, in five divisions. *Corolla* of one petal, somewhat funnel-shaped, irregular. *Stamens* declining. *Capsule* of five or ten cells; partitions from the inflexed margins of the valves.

1. *R. ferrugineum*. Rusty-leaved Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 1. Ait. n. 1. Jacq. Obs. fasc. 1. 26. t. 16. Austr. t. 255.—Leaves smooth; rusty beneath. Clusters terminal. *Corolla* with a cylindrical leprous tube. *Calyx* fringed.—Native of heathy plains on the alps of Switzerland, Savoy, Austria, Siberia, and the Pyrenees, flowering in August. It is not difficult of culture with us, in bog earth, on an open border, and is one of the most elegant of shrubs. The *stem* is about two feet high, very bushy. *Leaves* evergreen, stalked, alternate, elliptic-ob-

long, an inch or an inch and a half in length; convex, smooth, and dark shining green above; rusty beneath, but destitute of all pubescence. *Flowers* above half an inch long, in terminal roundish clusters; their *corolla* of a peculiarly rich and beautiful crimson, externally dotted with white. Haller says there is a rare white-flowered variety. The plain of mount Cenis glows with the rich blossoms of this plant in July and August, exhibiting one of the most lovely scenes in nature. See Smith's Tour on the Continent.

2. *R. birjacum*. Hairy Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 4. Ait. n. 3. Jacq. Austr. t. 98. (Ledum alpinum; Clus. Hist. v. 1. 82. Ger. Em. 1290. Balsamum alpinum Gesneri; Lob. Ic. 367.)—Leaves elliptic-obovate, sharpish, fringed; dotted beneath. *Corolla* with a cylindrical leprous tube.—Native of the Swiss and Austrian alps. Cultivated, like the former, in this country; flowering rather earlier. This is most nearly related to *R. ferrugineum*, next to which therefore we prefer placing it. The chief distinction consists in the *leaves* being fringed with rigid hairs; their form more obovate and flat, and their under side less rusty. We never could perceive much difference in the *flowers*, except perhaps those of *hirsutum* being rather paler, and more of a pink hue.

3. *R. dauricum*. Daurian Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 2. Ait. n. 2. Pall. Ross. v. 1. t. 32. Curt. Mag. t. 636. Andr. Repos. t. 4. (Chamærhododendros folio glabro majusculo, amplo flore roseo; Amm. Ruth. 181. t. 27.)—Leaves elliptic-oblong, dotted, naked. *Corolla* nearly wheel-shaped.—Native of Siberia, in mountainous situations. It succeeds in our gardens with the same treatment as the two foregoing, but flowers much earlier, and though evergreen in its own country, is less perfectly so with us; requiring moreover some shelter for its blossoms, during the severity or uncertainty of our winter or early spring. The *leaves* are dotted on both sides with minute scales, and their midrib is, when young, a little downy. *Flowers* rose-coloured, nearly sessile; their *corolla* widely expanded, with scarcely any tube, its outside slightly hairy, not leprous. Mr. Andrews seems to have printed "*petiolis longissimis*," by mistake for "*brevissimis*," as the *footstalks* are in fact very short.

4. *R. camtschaticum*. Barberry-leaved Rhododendrum. Pall. Ross. v. 1. p. 1. 48. t. 33. Willd. n. 3. (Chamærhododendros berberis folio, flore amplo roseo; Gmel. Sib. v. 4. 126.)—Leaves obovate, fringed, smooth, reticulated with veins. *Corolla* wheel-shaped. Found by Steller, in mountainous spots in Beering's island, and the north-east part of Kamtschatka, flowering in July and August. The shrubby *stems* are procumbent, branched, about a foot long. *Leaves* stalked, obovate, an inch or more in length, blunt, with a very small point, fringed at the margin, but smooth on both sides, destitute of dots or scales, of a thin texture, strongly and copiously reticulated with interbranching ribs and veins. *Flowers* rose-coloured, larger than the last, being nearly two inches wide, each on a long, solitary, hairy, terminal stalk. *Segments* of the calyx flat, oblong, obtuse, ribbed and veiny, sometimes very hairy externally, sometimes only fringed at the edges. This very showy plant is mentioned in Mr. Aiton's Epitome of Hort. Kew. 373, as having come into the hands of our cultivators in 1799, but we have never met with it in any garden.

5. *R. Ghamacistus*. Thyme-leaved Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 5. Ait. n. 4. Jacq. Austr. t. 217. Curt. Mag. t. 488. (Ledum foliis serpilli, ad margines ciliis instar pilosis, flore purpureo; Mich. Gen. 225. t. 106. Cistus humilis austriaca Clusii; Ger. Em. 1278.)—Leaves obovate, acute, fringed, polished, almost veinless. *Corolla*

RHODODENDRUM.

wheel-shaped.—Native of the alps of Austria, Carniola, and the north of Italy. First raised from seed in England, in 1786, by the skilful Mr. Loddiges of Hackney. A shrubby nearly procumbent plant, much smaller than the last, and differing essentially in the more thick and coriaceous texture of its *leaves*, which are of a dark green, and highly polished, with scarcely any visible veins. The elegant purple flowers are not above an inch broad. Their *calyx* has hairy, convex, not flat, segments. Anthers deep purple.

6. *R. caucaseum*. Caucasian Rhododendrum. Pall. Ross. v. 1. p. 1. 46. t. 31. Willd. n. 6. Ait. n. 5. Curt. Mag. t. 1145.—Stem decumbent. Leaves rugged above; downy and rusty beneath. Umbels terminal. Corolla nearly wheel-shaped.—Native of the loftiest summits of mount Caucasus, near perpetual snow, where, according to Pallas, nothing else, besides Whortle-berries and Juniper, grow. Introduced at Kew, by Sir Joseph Banks, in 1803. Mr. Loddiges finds it flower more freely under his care than the following. A low shrub, spreading on the ground, but of a stouter habit, with larger more coriaceous foliage, than any of the foregoing. The *leaves* are elliptical, stalked, three or four inches long; convex and of a dark shining green, with a rugose surface, above; concave, veiny, and covered with fine rusty down, underneath. *Footstalks* also downy. *Flowers* large, moderately concave; white or pale flesh-coloured within, their upper segments dotted about the base with green; the outside crimson. They form terminal umbels, with large, oblong, concave, permanent bractes at the base.

7. *R. chrysanthum*. Yellow Rhododendrum. Linn. Suppl. 237. Willd. n. 7. Ait. n. 6. Pall. Ross. v. 1. p. 1. 44. t. 30. (*R. officinale*; Salis. Parad. t. 80. Andromeda, n. 9; Gmel. Sib. v. 4. 121. t. 54.)—Stem decumbent. Leaves reticulated, smooth on both sides; paler beneath. Umbels terminal. Corolla nearly wheel-shaped. Native of the mountains of Siberia, Kamtschatka, and Beering's island. Introduced by Mr. Joseph Buth, in 1796, into our gardens, where it flowers, though rarely in the middle of summer, like the last. Some have imagined these two species to be varieties of each other; but the present differs essentially in having the *leaves* quite smooth and naked beneath, not to mention the uniformly yellow colour of the *flowers*. An infusion of the young leaves is much celebrated in Russia as a cure for the rheumatism. This medicine is taken internally, to promote perspiration. Some have recommended it for venereal complaints. Willdenow justly observes, that this shrub is altogether different from *R. dauricum*, to which the younger Linnæus, by some strange mistake, compares it.

8. *R. ponticum*. Purple Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 8. Ait. n. 7. Jacq. Ic. Rar. t. 78. Pall. Ross. v. 1. p. 1. 43. t. 29. Curt. Mag. t. 650. Andr. Repof. t. 379. (*Chamærhododendros pontica maxima*, folio laurocerasi, flore cæruleo-purpurascente; Tourn. Voyage, v. 2. 99.)—Leaves oblong, smooth and even on both sides. Corymbs terminal. Segments of the calyx oval, obtuse. Corolla bell-shaped, spreading.—Native of the Levant, in moist shady places. Common in the European gardens, where it blooms magnificently in the open ground in June, and, by forcing in a pot, may be had much earlier, as almost every window and balcony in London evinces. This shrub is usually five or six feet high, with brown spreading branches. The *leaves* are evergreen, a span in length, elliptic-lanceolate, or oblong, more or less acute; shining, dark green, even and smooth above; equally smooth, but paler beneath, contrary to Willdenow's definition. The large purple *flowers* grow, many together, in large, terminal, corymbose clusters. The gardeners obtain many varieties;

some of them with deciduous leaves, between this plant and the Azaleas. Tournefort thought the poisonous quality of the honey about Pontus, mentioned by ancient authors, might be partly owing to this plant; at least this seems to be what produced a sort of honey called *Moenomenon*, because, as Pliny relates, it took away the reason of those who ate it. What is generally reported of the honey of Pontus appears, however, by what Tournefort has collected, to belong to that yielded by *Azalea pontica*, our beautiful yellow Azalea; and this is confirmed by what the Turks told him of the dangerous effluvia of the flowers of this last mentioned plant.

9. *R. arboreum*. Indian Tree Rhododendrum. Sm. Exot. Bot. v. 1. 9. t. 6.—Leaves elliptic-lanceolate; smooth and shining above; downy beneath. Corymbs terminal. Capsule of ten cells. Stem arboreous.—Found by lieutenant-colonel Hardwicke, in the Sewalic chain of mountains, which separates the plains of Hindoostan, from the Himmaleh mountains. It generally grows in forests of oak, in elevated situations, where the soil is black vegetable mould, on a stony bed. The flowers appear in March and April; the seeds are ripened in May or June. The natives know this tree by the name of *Boorans*, and use the wood for the stocks of musquets. The stem is truly arboreous, rising in a columnar form to the height of twenty feet; its diameter being from sixteen to twenty-four inches. The bark is light as cork, flaking off in large portions. Branches ascending, crooked and brittle, leafy at their extremities. Leaves shaped much like the last, but distinguished by the dense, white, silky downiness of their under surface. Flowers in large terminal clusters, of a rich deep crimson, of little fragrance and short duration, their corolla shaped much like the last, but we do not find it spotted within. Segments of the calyx shallow. Germen elliptical, white and downy, with ten furrows. Capsule of the same shape, with ten cells, an unique instance, as far as we know, in the present genus; but certainly, all things considered, not authorising any generic separation of this species from the rest. We know not whether the seeds of this noble tree have vegetated in England. It would probably succeed in the moderate warmth of a conservatory.

10. *R. maximum*. Laurel-leaved Rhododendrum. Linn. Sp. Pl. 563. Willd. n. 9. Ait. n. 8. Pursh n. 1. Curt. Mag. t. 951. (*R. foliis nitidis ovalibus*, &c.; Trew Ehret. t. 66. *Kalmia foliis lanceolato-ovatis*, &c.; Mill. Ic. t. 228.)—Leaves oblong; convex and reticulated above; smooth and pale beneath. Corymbs surmounted by the branches. Segments of the calyx oval, obtuse. Corolla bell-shaped, spreading.—Native of mountainous situations in North America; near rivulets and lakes, flowering from June to August. Pursh. Though, according to Mr. Aiton, introduced by Peter Collinson in 1736, twenty-seven years before the *ponticum*, it is beyond comparison less common in our gardens. Botanists have not very clearly defined the specific difference between these two species. The leaves of the present are most convex, and more sensibly reticulated with minute sunk veins, on their upper side, while the under is still more pale, than in *ponticum*. The flowers of the *maximum* are more delicately coloured, having the red and white tints of an apple-blossom, while the green and yellow dots on their upper segment are strikingly conspicuous. All their segments are more elliptical, concave, and far less dilated and wavy than in *ponticum*. The inflorescence moreover is almost umbellate, and more dense, standing between two branches of the present year, which always rise considerably above it. There are many varieties in the gardens between these species. Mr. Pursh mentions two American varieties; or perhaps species: one with flatter leaves, and smaller

smaller whitish flowers: the other much taller, even twenty feet high, with large purple flowers, and much larger leaves, whose two sides are more alike in colour than the common *maximum*. This last variety, which we too have seen in Mr. Vere's curious garden at Kensington Gore, merits further examination, having certainly more resemblance to *ponticum* than to *maximum*, except its gigantic stature, which far exceeds both.

11. *R. punctatum*. Carolina Dotted-leaved Rhododendrum. Willd. n. 10. Ait. n. 9. Pursh n. 2. Andr. Repos. t. 36. Venten. Jard. de Cels, t. 15.—Leaves elliptic-oblong, acute; smooth above; sprinkled with minute resinous dots beneath. Umbels surmounted by the branches. Segments of the calyx rounded, very short. Corolla funnel-shaped, leprous externally.—Native of the mountains of South Carolina, from whence it was brought to England by the late Mr. John Frazer, in 1791. It succeeds well in our gardens on a peat border, flowering early in the summer. This is a much humbler shrub than any of the varieties of the *maximum*, though its mode of inflorescence accords with that species. The corolla is rose-coloured, dilated and wavy as in *R. ponticum*, but smaller; its outside rough or glandular, as in the *ferrugineum*. The leaves are elliptical, coriaceous, acute at both ends; dark green and very smooth above; paler, somewhat rusty, and very thickly besprinkled with glandular resinous dots, beneath.

12. *R. catawbiense*. Catawba Rhododendrum. Michaux Boreal-Amer. v. 1. 258. Pursh n. 3. Ait. Hort. Kew. Epit. 373. Curt. Mag. t. 1671.—Leaves oval, rounded at each end, smooth, paler beneath. Umbels surmounted by the branches. Segments of the calyx elongated. Corolla bell-shaped.—Native of the high mountains of Virginia and Carolina, particularly on the head waters of the Catawba river, flowering in May and June. Pursh. Mr. Frazer introduced it here in 1809, and brought a report of the flowers being scarlet; but they have since proved of a pale purplish rose-colour, with very slight traces of those green dots within, which make so great a part of the beauty of *R. maximum*. The shrub is of a very humble size, hardly three feet high, and flowering before it attains even that height; but all its parts are large. The leaves are broad, coriaceous, rounded and blunt at both ends; paler beneath, and very obscurely dotted on the veins. The segments of the calyx are said to be remarkably elongated, an essential mark of distinction, which ought to have been shewn in the, otherwise excellent, figure. We cannot help wishing also that the uncouth name, given by Michaux, had not been retained; but who shall cleanse the Augean stable of modern botanical nomenclature?

RHODODENDRUM, in Gardening, contains plants of the hardy, deciduous, and evergreen, flowering, shrubby kinds, the dwarf rose-bay, of which the species cultivated are, the rusty-leaved rhododendrum (*R. ferrugineum*); the hairy rhododendrum (*R. hirsutum*); the dwarf rhododendrum, or rose-bay (*R. chamæcistus*); the purple rhododendrum (*R. ponticum*); and the broad-leaved rhododendrum (*R. maximum*).

Method of Culture.—These plants may be increased by sowing the seeds, which are very small, as soon as possible after they are procured, either in a shady border, or in pots filled with fresh loam, having them very lightly covered with a little fine mould, and plunging the pots up to their rims in a shady border, and in hard frost covering them with bell or hand-glasses; taking them off in mild weather. When they are sown early in autumn, the plants come up the following spring, when they must be kept shaded from the sun, especially the first summer, and duly refreshed with water; in the autumn following removing them to a shady

situation, on a loamy soil, covering the ground about the roots with moss, to guard them from the frost in winter and keep the ground moist in the summer season. They may also be increased from suckers or offsets, which they produce plentifully where they grow naturally, but seldom in this climate.

And they are very ornamental in the border, clumps, and other parts of shrubberies.

RHODODENDRUM *Crysanthemum*, golden-flowered rhododendrum, in the *Materia Medica*. The leaves of this species are used in medicine. They are inodorous, and have an austere, astringent, bitterish taste. Water extracts their virtue either by infusion or decoction. These leaves are reckoned stimulant, narcotic, and diaphoretic. Upon being taken, they first increase the arterial action and heat of the body, producing diaphoresis, which effects, according to Dr. Home, are followed by a proportional diminution of excitement: the pulse in one case having been reduced 38 beats. In large doses, they produce nausea, vomiting, purging, delirium, and all the symptoms of violent intoxication. The plant and its effects were first described by Gmelin and Steller in 1747, as a Siberian remedy for rheumatism; but it was not much noticed till after 1779, when Kæmpfer strongly recommended it in this disease, and also in gout and lues venerea. It has not been much used in this country; but from the result of some trials of it in Scotland, it obtained a place in the Edinburgh Pharmacopeia. It has been given in the form of decoction, made by boiling ʒiv of the leaves in fʒx of water, in a close vessel, over a slow fire, for 12 hours. The dose of the strained liquor is from fʒj to fʒij given twice a day, and generally increased. Woodv. Med. Bot. Thomson's Lond. Dif.

RHODOLÆNA, in Botany, from ῥόδον, a rose, and χλαμα, a cloak, or outer covering; a genus so named by Aubert du Petit-Thouars, in his *Plantes des Isles d'Afrique*, fasc. 3, because of the fine rose colour of the flowers, which are said to be very large and splendid. *De Theis*.

RHODOMAN, LAWRENCE, in Biography, a learned German, was born, in 1546, at Saffowerf, in Upper Saxony. He studied at the college of Ilfeld, and acquired such a knowledge of classical literature, that he became an able instructor both in public and private. He taught in several seminaries of learning, and was professor of Greek at Jena seven years, and of history at Wittemberg for four years. He died in 1606, at the age of 60. He was deeply learned in the Greek language; but his chief service to literature was by his Latin version of Diodorus Siculus: he was author of a history of Martin Luther, in Greek verse, and many other pieces. Bayle.

RHODOMELON, a name given by the ancients to a confection made of roses, quinces, and honey, used as a grateful astringent and detergent in many cases.

RHODON, in Pharmacy, from ῥόδον, rosa, a name applied to some compositions, where roses are the chief ingredient, as *diarrhodon*, &c. Hence also *rhodofaccharum*, i. e. sugar of roses. See ROSE.

RHODOPE, in Biography, a famous courtesan and player on the flute, in antiquity, was born in Thrace. She was at first a slave in the same house as Æsop. Charaxus, the brother of Sappho, was violently enamoured of her, and having purchased her, gave her her liberty. She established herself at Mucrates, where she became a courtesan, and amassed immense riches. Pliny says that she built, at her own expence, the most beautiful of the Egyptian pyramids; but Herodotus, and Bayle from his authority, reject this tale; nor do they give any more credit to the following story.

One day, when she was bathing, and her attendants watching

watching her clothes, an eagle pounced upon one of her shoes, and carrying it away, flew with it to Memphis, where he let it fall near king Psammiticus. This prince, admiring the beauty of the shoe, ordered the officers of his household to seek, throughout all Egypt, the person to whom the shoe appertained. She was found and brought to him; and he espoused her. But how are we to reconcile this fact with her being married to Æsop? It is, however, certain, say the Encyclopædists, that this fabulist, notwithstanding his deformity and ugliness, had the art to make himself beloved by her.

RHODOPUS GALLINULA, in *Ornithology*, a name given by some authors to the bird more usually known by the name *tringa*.

RHODORA, in *Botany*, so called by Linnæus, from *ῥόδον*, a rose, in allusion to the colour of its flowers, and probably, at the same time, to preserve an analogy with its near relation *Rhododendrum*.—Linn. Gen. 218. Schreb. 294. Willd. Sp. Pl. v. 2. 603. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 49. Pursh v. 1. 298. Juss. 159. Lamarck Illustr. t. 364. Class and order, *Decandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juss.

Gen. Ch. Cal. Perianth inferior, minute, of one leaf, with five teeth, permanent. Cor. Petals three, unequal; the two lowermost lanceolate, equal; the upper one wedge-shaped, ascending, three-lobed, the middle lobe rather longest. Stam. Filaments ten, thread-shaped, declining, the length of the corolla; anthers rounded, two-lobed. Pist. Germen ovate, furrowed, superior; style thread-shaped, declining, rather longer than the stamens; stigma thickest, abrupt, convex. Peric. Capsule ovate-oblong, with five furrows, of five cells and five valves, the partitions from the inflexed margins of the valves. Seeds numerous, minute.

Ess. Ch. Calyx five-toothed. Corolla of three petals, unequal. Stamens declining. Capsule superior, of five cells; the partitions from the inflexed margins of the valves.

1. *R. canadensis*. Canadian Rose-blossom. Linn. Sp. Pl. 561. Willd. n. 1. Ait. n. 1. L'Herit. Stirp. v. 1. 141. t. 68. Curt. Mag. t. 474. (*Chamærhododendros*; Duham. Sem. Append. 10. t. 27. f. 2, 3.)—Native of Canada and Newfoundland; very hardy in our gardens, except that, flowering in April and May, its blossoms are often injured. Curtis says it bears gentle forcing remarkably well. Sir Joseph Banks brought this shrub to England in 1767; but it flowered at Paris, for the first time, in March 1756. Duhamel suggested the propriety of establishing it as a new genus, which Linnæus adopted and named; but afterwards, having never seen the plant, he struck it out, nor did he assign any reason for this measure. The accuracy of Duhamel is, at length, confirmed, and the *Rhodora* re-established. The stem is bushy, erect, two or three feet high, with round, smooth, grey or reddish branches, never quite straight. Leaves deciduous, alternate, stalked, elliptical, acute, entire, veiny, hairy, slightly glaucous, about an inch and half long, and half an inch wide. Flowers appearing before the leaves, in terminal solitary umbels, four or five in each umbel, of a bright elegant rose colour, with violet anthers, inodorous. Petals spreading, each an inch long. Capsule clothed with rusty down.

RHOE, in *Ancient Geography*, a river of Asia Minor, in Bithynia.

RHŒADEÆ, in *Botany*, the 27th natural order, among the *fragmenta* of Linnæus; of which there is no explanation in his *Prælectiones*, published by Giseke. The genera referred hither, at the end of the Gen. Pl., are *Argemone*, *Chelidonium*, *Papaver*, *Podophyllum*, *Sanguinaria*,

Bocconia. We place them according to the manuscript corrections of the author, who has subjoined *Cytinus*, *Ariftolechia*, and *Afarum*.

This order, without the additions, which certainly do not belong to it, is equivalent to the first section of Jussieu's *PAPAVERACEÆ*. (See that article.) Its name is taken from the Greek appellation of the field poppy, *ῥοίον*, *Papaver Rhæas* of Linnæus; which was so called from *ῥεω*, to fall off, because of the short duration of its petals.

RHŒAS, in *Surgery*, a diminution of the caruncula lachrymalis from disease.

RHŒTICO, in *Geography*, a mountain of Germany, in the county of Pludentz; 6 miles S. of Pludentz.

RHŒTUM, or **RHŒTIUM**, in *Ancient Geography*, a town of Asia Minor, in the Troade, on the coast of the Hellespont. According to Strabo, it was built on an eminence near the tomb of Ajax. The promontory called "Rhætium" was four miles distant from that of Sigæum.

RHŒXUS, a port of Asia, on the coast of Cilicia, at the mouth of the river Sarus. Steph. Byz.

RHŒZIA, in *Geography*, a city of Persia, in the province of Mingrelia, situated on the Hippus, the usual residence of the princes of Mingrelia, but which they changed in summer for Taqueri, a very pleasant spot, seven versts S. of Ghoni. In Rhæzia much silk is cultivated; and all that is prepared in the other parts of Mingrelia is also carried thither, to be sold or manufactured. The manufacture, however, of that commodity is not well understood, as they only make a poor sort of handkerchiefs, or common tafeties.

RHOGE, in *Ancient Geography*, an island on the coast of Lycia, placed by Pliny in the vicinity of that of Cyprus. Steph. Byz.

RHOGME, in *Surgery*, a rupture or fracture.

RHOGMOI, in *Ancient Geography*, a port of Asia, on the coast of Cilicia. Steph. Byz.

RHOGOMANIS, or **RHOGONIS**, a river of Asia, in the Perside. Ptolemy places the mouth of this river in the southern part of the Perside, on the Persian gulf. According to Nearchus, it was a small river, 200 stadia from the river Granis.

RHOITES, the name of a medicine among the ancients, which is a sort of rob of the juice of pomegranates. Dioscorides describes it as the simple juice of the fruit, evaporated over the fire to the consistence of an extract; but Paulus Ægineta gives the receipt to be three parts juice of pomegranate, and one part honey, boiled to the evaporation of a third part. So that the rhoites of Dioscorides was a true rob of pomegranates; the other rather honey of pomegranates, like our honey of roses.

RHOMB. See **RHOMBUS**.

RHOMBITES, in *Ancient Geography*, a river of Asiatic Sarmatia. Ptolemy.

RHOMBO, in *Ichthyology*, the name of a peculiar fish of the rhombus, or turbot kind, called *rhombus aculeatus* by Aldrovand, Gesner, and other writers. It is a large fish, of an ash-coloured green on the back, and white on the belly. It has no scales; but the skin of its back is divided by lines, something in the manner of the skins of snakes. The mouth is very large, and is well furnished with teeth; and the palate has a number of tubercles, armed also with a sort of teeth. It feeds on fish, and its flesh is very delicate. It is very common in the markets at Venice, and is caught in the neighbouring seas, and in many other places. See **PLEURONECTES Maximus**.

RHOMBOIDÆUS Major and *Minor*, in *Anatomy*, names given by Albinus to what he makes two muscles, though Winslow and others account it only one. What

Winslow

Winflow calls the inferior portion of the rhomboidalis, Albinus calls rhomboidæus major; and what he calls the upper portion of that muscle, Albinus calls rhomboidæus minor. See RHOMBOIDES.

RHOMBOIDALIS. See RHOMBOIDÆUS.

RHOMBOIDES, in *Geometry*, a quadrilateral figure, whose opposite sides and angles are equal, but which is neither equilateral nor equiangular; or, it is an oblique-angled parallelogram.

Such is the figure NOPQ, *Plate XII. Geometry, fig. 1.* For the method of finding the area of a rhomboides, see RHOMBUS.

RHOMBOIDES, in *Ichthyology*. See CHÆTODON *Argus*, *Striatus*, &c.

RHOMBOIDEUS, in *Anatomy*, a muscle of the shoulder, so called on account of its shape; dorso-scapulien of Chaussier.

It is a broad, flattened, quadrilateral muscle, placed obliquely at the lower part of the neck and upper part of the back, and extending from the lower portion of the ligamentum nuchæ, and the superior spinous processes of the back, to the basis of the scapula. The whole of its fibres go obliquely from the spine downwards and outwards to the scapula; thus as it is regularly quadrilateral, it has a correct rhomboid figure. Its posterior surface is chiefly covered by the trapezius; the latissimus dorsi lies on a small portion of it below; and between these two muscles its fibres are covered by the skin only. The serratus superior posticus, splenius, longissimus dorsi, sacrolumbalis, the ribs, and the external intercostal muscles, are covered by its anterior surface. Its upper edge goes from the lower part of the ligamentum nuchæ, obliquely outwards and downwards, to the basis of the scapula opposite to the commencement of the spine of the bone. In great part of its extent this edge is in contact with the levator scapulæ. The lower margin reaches from the spinous process of the fourth or fifth dorsal vertebra to the inferior angle of the scapula. The two edges are nearly of equal length, and parallel to each other. The internal edge is attached to the lower portion of the ligamentum nuchæ, to the last cervical spinous process, to the four or five superior dorsal spines, and to the interspinal ligaments of those bones. The outer edge is fixed to the basis of the scapula, from its inferior angle to above the origin of the spine, between the supra and infra spinatus behind, and the serratus magnus in front.

The rhomboideus is partly muscular, partly aponeurotic. Its inner edge is attached by aponeurotic fibres, having the same direction as the fleshy one, short above, and longer below. It is fixed to the upper part of the scapula by short aponeuroses; its insertion in the remainder of the basis is by an aponeurosis attached only at its upper and lower extremities, leaving a passage between these points for branches of the transversalis colli artery. The muscular fibres are all directed obliquely from within outwards, and from above downwards.

The muscle is generally divided into two portions, united by cellular tissue to a superior smaller, and an inferior larger one: these are called the rhomboideus minor and major.

By drawing the basis of the scapula obliquely upwards and backwards, the rhomboideus carries the inferior angle towards the spine, and makes the anterior angle of the bone, constituting the shoulder, roll forwards and downwards. Thus it restores the scapula to its situation after the shoulder has been raised. It concurs in this action with the levator scapulæ.

RHOMBOIDIA, in *Natural History*, the name of a genus of spars, given them from their being of a rhomboidal

form. They owe this figure to an admixture of particles of iron, and consist of six planes.

Of this genus there are only two known species, viz. a white thin one with very thin crusts, and a whitish-brown thick one with thicker crusts. They are both found in the forest of Dean in Gloucestershire, and in other places, where there are iron-ores. Hill.

RHOMBUS, *ῤομβος*, is formed of *ῤομβος*, of *ῤομβειν*, to encompass or turn round, in *Geometry*, an equilateral rhomboid; or a quadrilateral figure, whose sides are equal and parallel, but the angles unequal; two of the opposite ones being obtuse, and the other two acute. Such is the figure ABCD, *Plate X. fig. 11.*

To find the Area of a Rhombus, or Rhomboides.—Upon CD, which is here assumed as a base, let fall a perpendicular AE, which will be the altitude of the parallelogram: multiply the base by the altitude, the product is the area. Thus, if CD be = 456, and AE = 234, the area will be found 106704.

For it is demonstrated, that an oblique-angular parallelogram is equal to a rectangle upon the same base CD, and of the same altitude AE (see PARALLELOGRAM). But the area of a rectangle is equal to the factum of the base into the altitude; therefore the area of an oblique-angular parallelogram is equal to the same. See RECTANGLE.

The area of a parallelogram, rhombus or rhomboides, may be found by means of the following proportion: As radius, i. e. sine of 90° or tangent of 45°, is to the sine of any angle of a parallelogram, so is the product of the sides including the angle to the area of a parallelogram: that is, AD × DC × nat. sine of the angle D = the area. For having drawn the perpendicular AE, the area, by the first rule, is AE × DC; but as rad. 1 (sin. < E) : sin. < D :: AD : AE = sin. < D × AD; therefore AE × DC = DC × sin. < D × AD is the area; or, 1 : sin. < D :: AD × DC : sin. < D × AD × DC = the area of the parallelogram.

N.B. As the angles of a square and rectangle are each 90°, whose sine is 1, this rule is the same as the former.

E. G. 1. What is the area of a rhomboides, whose length is 36 feet, slope-height 25.5 feet, and one of the less angles 58°? Here rad. or 1 : .8480481 (nat. sine of 58°) :: 918 (= 25.5 × 36) : 778.5081558, the area. Or, by using the logarithms, rad. (10.0000000) : sin. 58° (9.9284205) :: log. of 918 (2.9628427) : 778.5081, the number corresponding to the log. (2.8912632).

2. What is the area of a parallelogram whose angle is 90°, and the including sides 20 and 12.25 chains? Anf. 245 acres.

3. What is the area of a rhombus, each of whose sides is 21 feet 3 inches, and each of the less angles 53° 20'? Anf. 362.208757 feet.

4. How many acres are in a rhomboides whose less angle is 30°, and the including sides 25.35 and 10.4 chains? Anf. 13 acres 29.12 perches.

The area of either of the forementioned figures may also be had by the following rule, which is common to all quadrilaterals. As radius is to the sine of the angle which the intersecting diagonals of a parallelogram make with each other, so is the product of the diagonals to double the area:

that is, $\frac{AC \times BD \times \text{nat. sine of the angle R}}{2} = \text{the area.}$

N. B. Because the diagonals of a square and rhombus intersect at a right angle, whose sine is 1, half the product of their diagonals is the area; that is, $\frac{1}{2} AC^2$ in the square and $\frac{1}{2} AC \times BD$ in the rhombus is the area.

E. G.

E. G. 1. How many acres are in a piece of land, in the form of a rhombus, whose diagonals are 30 and 20 chains? Anf. 30 acres.

2. How many yards of painting are in a rectangle, whose diagonals, intersecting in an angle of 30° , are each 32 feet? Anf. $28\frac{1}{2}$.

3. What is the area of a rhomboides, whose diagonals, making an angle of 60° , are 30 and 25 feet? Anf. 324.7595 feet. Hutton's Mensuration.

RHOMBUS, *Solid*, two equal and right cones joined together at their bases.

RHOMBUS, in *Ichthyology*, a species of the *Pleurenectes*; which see. See also *PLEURONECTES Maximus* and *TURBOT*, and *P. Passer*.

RHOMBUS, in *Conchology*, the name given by the generality of authors to a genus of the shell-fish, much more properly called by some *cylindrus*.

RHOMBUS, among *Surgeons*, denotes a sort of bandage of a rhomboidal figure.

RHON, in *Ancient Geography*, a river of India, among the people called *Gandarii*. Steph. Byz.

RHONDE, in *Geography*. See *RONDE*.

RHONE, a river of France, formed by the union of three springs, which rise in mount Susberg, a part of the Grimsell, at the eastern extremity of the Valais. It passes through the lake of Geneva to Seille, &c. and thence to Lyons, where it joins the Saône, and after watering Vienne, Valence, Viziers, Avignon, Arles, &c. discharges itself by several mouths into the Mediterranean.

RHONE, *Mouths of the, Bouches de Rhône*, one of the twelve departments of the S.E. region of France, bounded on the N. by the county of Venaissin, on the N.E. by the department of the Lower Alps, on the E. by the department of the Var, on the S. by the Mediterranean, and on the W. by the department of the Gard: 5315 kilometers in extent, or 269 square leagues, and containing a population of 320,072 persons. It is divided into three circles or districts, including 26 cantons and 108 communes. The circles are, Marseilles, having 142,058 inhabitants; Aix, 97,938; and Tarascon, 80,076. According to M. Hauffenfratz, its extent in French leagues is 30 in length and 20 in breadth; its circles are 5, its cantons are 40, and its population consists of 446,643 persons. It is a portion of Lower Provence, and lies in N. lat. $43^\circ 40'$. Its capital is Aix. Its contributions to the land-tax, &c. amounted, in the 11th year of the French era, to 3,612,199 fr.; and its expences, administrative, judiciary, and for public instruction, to 354,531 fr. 33 cents. Many of the hills in the northern districts are bare rocks, destitute of soil and verdure. The chief productions of the department are grain, wine, silks, olives, fruits, and pastures. It has mines of iron, alum, vitriol, with quarries of marble, &c. Pools and marshes are dispersed near the coast.

RHONE, or *Rhone and Loire*, one of the eleven departments of the E. region of France, bounded on the N. by the department of the Saône and Loire, on the E. by the departments of the Ain and the Ière, on the S. by the departments of the Ardèche and the Upper Loire, and on the W. by the departments of the Puy de Dôme and the Allier: to the E. it is bounded by the river Rhine, and the Loire passes nearly through its centre from N. to S. Its extent is 2935 kilometers, or 147 square leagues, and its population consists of 345,644 persons. It is divided into 2 circles, 25 cantons, and 261 communes. Its circles are Villefranche, including 106,262 inhabitants, and Lyons, having 239,382. According to Hauffenfratz, its extent in French leagues is 20 in length, and 9 in breadth; its circles are 2, its cantons

32, and its population is 323,177. It lies in N. lat. 46° between Ain and Loire, and comprehends the provinces formerly called Lyonnais and Beaujolais. Its capital is Lyons. The plains yield scanty crops of grain and pasture; the gentle eminences are covered with vineyards, and the summits of the mountains are clothed with pines. This department has mines of copper, lead, coal, quarries of marble, freestone, &c.

RHOPALA, in *Botany*, a name altered by Schreber from the *Roupala* of Aublet, which, being of barbarous origin, and unexplained by the publisher, he contrived, by the above alteration, to derive from *ροπαλον*, a club, or stake. This may very well apply to the size and nature of the woody stem, which rises to the height of three or four feet, before it sends off any branches. Vahl and Willdenow have contrived to retain the barbarism, without adding any thing to the sense.—Schreb. 62. Brown. Tr. of Linn. Soc. v. 10. 190. (Roupala; Aubl. Guian. v. 1. 83. Juss. 79. Lamarck Illustr. t. 55. Gærtn. suppl. t. 217. Rupala; "Vahl Synb. v. 3. 20." Willd. Sp. Pl. v. 1. 536.)—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Proteaceæ*, Juss. Brown.

Gen. Ch. Cal. none. Cor. Petals four, spatulate, regular, concave, recurved at the extremity. Nectary of four glands, separate or combined, at the base of the germen. Stam. Filaments four, short, inserted above half way up the petals; anthers oblong, two-lobed, projecting beyond their recurved extremities. Pist. Germen superior, ovate, with rudiments of but two seeds; style awl-shaped, permanent, the length of the corolla; stigma vertical, club-shaped, undivided. Peric. Follicle ovate, somewhat woody, of one cell. Seeds two, bordered, winged at each end, the kernel central.

Eff. Ch. Calyx none. Petals four, regular, recurved. Stamens inserted into the middle of each petal. Nectary of four glands. Stigma vertical, club-shaped. Follicle of one cell. Seeds two, bordered, winged at each end.

The habit of the genus is arborecent. Leaves alternate, rarely whorled; simple, entire or toothed, rarely pinnate, or ternate, on the same branch. Spikes axillary, sometimes terminal, racemose, the flowers in pairs with a single bractea to each pair.

1. *R. montana*. (*Roupala montana*; Aubl. Guian. v. 1. 83. t. 32. Lamarck t. 55. *Rupala montana*; Willd. n. 1.)—Leaves alternate, entire, ovate, folded, short-pointed, reticulated with veins. Spikes axillary, solitary, longer than the leaves. Flower-stalks, petals and germen clothed with rusty down.—Native of the Serpent Mountain in Guiana, flowering in August. *Aublet*. A small tree, seven or eight feet high; its trunk three or four feet. Bark wrinkled and cracked, whitish, as well as the wood. Both exhale, when cut, a strong fetid scent, like that of the serpents of the same country. Leaves smooth, of a firm dry texture, about three inches long. Footstalks an inch long, inflated at the base. Flowers about eight or ten alternate sessile pairs, in each lax spike.

2. *R. media*. Brown n. 2.—Leaves alternate, entire, ovate, flat, pointed, running down the footstalk, with depressed veins. Clusters axillary, solitary, longer than the leaves. Partial flower-stalks and petals somewhat hairy. Germen downy.—Gathered in the same country by Von Rohr, who sent specimens to Sir Joseph Banks. This seems very nearly related to the foregoing.

3. *R. nitida*. Br. n. 3. (*Roupala nitida*; Rudge Guian. v. 1. 26. t. 39.)—Leaves alternate, entire, elliptical, short-pointed, flat. Clusters axillary, solitary, about the length of the leaves. Partial flower-stalks, petals and germen smooth.—Gathered by Joseph Martin in Guiana. *Brown*.

4. *R. moluccana* Br. n. 4.—Leaves alternate, entire, elliptical, flat, finely veined, somewhat reticulated, longer than the clusters. Partial flower-stalks and petals smooth.—Gathered in the Molucca islands, by the late Mr. Christopher Smith. *Herb. Banks.*

5. *R. cochinchinensis*. Br. n. 5. (*Helicia cochinchinensis*; Lour. *Cochinch.* 83, on the authority of a specimen seen by Mr. Brown, in Sir Joseph Banks's collection, from the author.)—Leaves alternate, elliptic-ovate, short-pointed, flat, somewhat ferrated above half way down. Clusters axillary, solitary, about the length of the leaves. Partial flower-stalks, petals and germen smooth.—Native of woods in Cochinchina. (See *HELICIA*.) Mr. Brown observes, that what Loureiro describes as a four-cleft calyx, are really the nectariferous glands, united at their base, and remaining after the petals are fallen. Such a mistake might well render his description unintelligible, without a sight of the plant.

6. *R. ferrata*. Br. n. 6.—Leaves alternate, broadly elliptical, scarcely pointed, ferrated; somewhat contracted and entire at the base; paler beneath. Clusters axillary, solitary, shorter than the leaves. Partial flower-stalks, petals and germen downy.—Gathered by Mr. Christopher Smith in the Molucca isles.

7. *R. dentata*. Br. n. 7.—Leaves alternate, ovato-lanceolate, folded, toothed, tapering at each end; with a linear point. Clusters axillary, solitary, rather longer than the leaves. Petals and germen downy.—Gathered by Mr. Alexander Anderson in Guiana. *Herb. Banks.*

8. *R. peruviana*. Br. n. 8. (“*Embothrium monospermum*; Fl. Peruv. et Chil. v. 1. 63. t. 98.”)—Leaves alternate, ovate, ferrated, woolly; rusty beneath. Clusters axillary, solitary, longer than the leaves.—Native of the colder mountains of Peru.

9. *R. diversifolia*. Br. n. 9. (“*Embothrium pinnatum*; Fl. Peruv. et Chil. v. 1. 63. t. 99.”)—Leaves alternate, simple or pinnate, very veiny; downy beneath. Clusters axillary, solitary, longer than the leaves. Follicles cimeter-shaped, downy.—Native of waste ground, and the borders of fields, in Peru.

10. *R. fessilifolia*. Br. n. 10. (*Roupala fessilifolia*; Richard Act. Soc. Hist. Nat. Par. v. 1. 106. Poiret in Lamarck Dict. v. 6. 316. *Rupala fessilifolia*; Willd. n. 2. *Ropala hameliaefolia*; Rudge Guian. v. 1. 22. t. 31.)—Leaves four in each whorl, nearly sessile, oblong, somewhat wedge-shaped, slightly pointed, entire. Clusters terminal, umbellate. Flowers whorled.—Native of Guiana. The leaves are, in the figure, precisely obovate, tapering at the base, a span long. Clusters about the same length, erect, stalked, forming an umbel at the top of the branch or stem; their partial stalks hairy, imperfectly whorled, very numerous.

RHOPALIC VERSES, among the *Ancients*, a kind of verses which began with monosyllables, and were continued in words growing gradually longer and longer to the last, which was the longest of all.

They had their name from the Greek ῥοπάλον, a club, which, like them, begins with a slender tip, and grows bigger and bigger to the head. Such is that verse of Homer:

Ω μακρὰ Ἀτρεΐδῃ μοιγενεῖς, οὐβιδάμαν.

And this Latin one of Ausonius:

“Spes deus æternæ stationis conciliator.”

RHOPALOSIS, a distemper of the hair described by the ancients, and seeming to be the same with what we call the *Plica Polonica*; being a sort of matting together of the hair into long and thick tresses.

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RHOPE, formed of ῥεπω, to preponderate, a word used by the Greek writers to express a violent tendency of the humours to any particular part of the body.

RHOPIUM, in *Botany*, from ῥωπιον, a slender shoot, the flower-stalks of this plant having a delicate, twiggy appearance.—Schreb. 608. Willd. Sp. Pl. v. 4. 150. (Meiborea; Aubl. Guian. 826. Juss. 437. Lamarck Illustr. t. 731.)—Class and order, *Gynandria Triandria*. Nat. Ord. *Euphorbia*, Juss. See *MEBOREA*.

Gen. Ch. Cal. Perianth inferior, of one leaf, permanent, cloven into six, lanceolate, acute segments, each having a little bordered cavity at the base. Cor. none. Stam. Filaments none; anthers three, cloven, each adhering to a single style under the stigma, with distant cells, bursting transversely. Pist. Germen superior, roundish or triangular; styles three, erect, approximated; stigmas flat, acute, bent down over the anthers. Peric. Capsule composed of three obtuse-angled lobes, with six cells, and six valves: partitions from the middle of the valves. Seeds two, one adhering to each side of the partition, ovate.

Ess. Ch. Calyx six-cleft. Corolla none. Anthers three, with remote cells, and placed in the middle of the styles. Styles three. Capsule three-lobed, of three cells, each with two seeds.

1. *R. citrifolium*. Willd. (Meiborea guianensis; Aubl. Guian. t. 323.)—Native of woods in Guiana, where it flowers and bears fruit in January. The stem of this shrub is from three to four feet in height, branched towards the summit. Leaves alternate, ovate, acute, smooth, entire, nearly sessile. Stipules twin, small, deciduous. Flowers corymbose, axillary and terminal, of a yellowish-green colour, each standing on a long, slender stalk, which is furnished with a scale at its base.

RHOPOGRAPHI, ῥοπογραφοί, formed of ῥοπος, toys or odd ware, and γραφαί, I paint, in *Antiquity*, an appellation given to certain painters, who confined themselves to low subjects, such as animals, plants, landscapes, &c.

The same appellation has been also given to such as cut figures of men, &c. in box, phillyrea, yew, &c. in gardens.

RHOSOLOGIA, in *Ancient Geography*, a town of Asia, in Galatia, in the country of the Teitlages, between Venzala and Sarmalia. Ptolemy.

RHOSOS, a town situated on the gulf of Issus, at the eastern extremity of the Mediterranean sea, between two defiles, one of which led to Syria, and was called the “gates of Syria;” and the other formed by mount Amanus and the sea-coast, communicating with Cilicia, and called the “Amanic gates.” Ptolemy places this town in Syria, and Strabo places it in Cilicia. After the death of Seleucus Nicator, Demetrius caused the statue of Fortune to be conveyed hither. It was famous for the manufacture of earthen vessels, mentioned by Cicero, when he was governor of Cilicia, in a letter to Atticus. Sapor, king of Persia, burnt this city, after he had taken prisoner the emperor Valerian, A.D. 260. It was pillaged under the reign of Arcadius, in the year 404, by the Haurians, a savage people, who inhabited the mountains. Jupiter was worshipped in this town; and the statue of this deity was engraven on the medals of Rhofos.

RHOSSICUS SCOPULUS, a promontory of Asia, in Syria, near the gulf of Issicus.

RHOT, in *Geography*, a river of Switzerland, which runs into the Aar, 5 miles W. of Zossingen.

RHOTANUM, in *Ancient Geography*, a river of Corsica, the mouth of which is placed by Ptolemy on the eastern side, between Valeria Colonia and the port of Diana.

RHOX, a word used by some authors to express the tunica uvea of the eye.

RHUBARB, **RHABARBARUM**, in *Botany*. See **RHEUM**.

RHUBARB, *Rheum Palmatum*, in the *Materia Medica*. The rhubarb, called the rhabarbarum officinale, was supposed, in the year 1732, to be supplied by some plants sent from Russia, to Jussieu of Paris, Rand at Chelsea, and Linnæus at Upsal. Accordingly these plants were adopted by Linnæus, in his first edition of the *Species Plantarum*, under the name of rheum rhabarbarum. This, however, was not very generally received as the genuine rhubarb plant. But in order to ascertain this matter more completely, Kaul Boerhaave procured, from a Tartarian rhubarb merchant, the seeds of those plants, which he annually sold, and which were admitted at Petersburg to be the true rhubarb. These seeds were soon discovered by de Gorter to produce two distinct species; *viz.* the *R. rhabarbarum* of Linnæus, or *R. undulatum*, as it has been since called; and another species, declared by Linnæus to be a new one, and first mentioned in the second edition of the *Species Plantarum*, in 1762, under the name of *R. palmatum*. But before this time, de Gorter had repeatedly sent its seeds to Linnæus, and the young plants constantly perished: at length he obtained the fresh root, which succeeded very well at Upsal, and enabled the younger Linnæus to describe this plant in the year 1767. However, two years antecedent to this, Dr. Hope's account of the rheum palmatum, as it grew in the Botanic garden near Edinburgh, had been read before the Royal Society at London; and of the great estimation in which this plant was held by him we have the following proof. "From the perfect similarity of this root with the best foreign rhubarb in taste, smell, colour, and purgative qualities, we cannot doubt our being at last possessed of the plant which produces the true rhubarb, and may reasonably entertain the agreeable expectations of its proving a very important acquisition to Britain." (See *Phil. Trans.* for the year 1765.) But from the relation above given, it appears that the seeds of both *R. undulatum* and *R. palmatum* were transmitted to Petersburg as those of the true rhubarb: we are therefore to conclude, that the former species has an equal claim to this importance with the latter; and from further inquiries made in Russia, there is the best authority for believing that the *R. compactum* also affords this very useful drug. Bergius says, "*Rheum palmatum* producit *rhabarbarum* in officinis *Sibiricum* appellatum: certe e feminibus a Bucharis e montosis Tibeti in Russiam apportatis, et postea fatis hocce rheum palmatum enatum est." (Vide Pallas Reise, &c. vol. iii. p. 157.) "*Rhabarbarum* vero *Chinense* ex alia specie rhei desumptum esse videtur." (Vide Georgi Reise, &c. vol. i. p. 211.) The seeds of the rheum palmatum were first introduced into Britain in 1762, by Dr. Mounsey, who sent them from Russia, and were supposed to be a part of those already mentioned; and since their prosperous cultivation by the late professor of botany at Edinburgh, the propagation of this plant has been gradually extended to most of our English gardens, and with a degree of success which promises in time to supersede the importation of the foreign root. The *R. rhaponticum* is a different species from either of these. This is supposed to be the rhabarbarum of the ancients. It is well known that the ancient rhubarb had not the purgative virtues of the modern. Two sorts of rhubarb are usually imported into this country for medical use, *viz.* the Chinese and the Tartary rhubarb. Mr. Bell informs us, in his travels, that the best rhubarb grows in that part of the Eastern Tartary called Mongallia, which serves as a boundary between Russia and China; or,

on the chain of mountains in Tartary, which stretches from the Chinese town Selin to the lake Kokonor, near Thibet. This plant, he says, does not run and spread itself like docks, but grows in tufts at uncertain distances, as if the seed had been dropped with design. As the Mongalls do not think it worth cultivating, the marmots, which burrow under the shade of its spreading leaves, and probably feed on its leaves and roots, contribute to its increase, partly by the manure which their dung affords it, and principally by casting up and loosening the earth, into which the ripe seeds, blown by the wind, fall, and where they immediately take root. After digging and gathering the rhubarb, the Mongalls cut the large roots into small pieces, in order to make them dry the more readily. The roots are taken up in autumn, according to Mr. Bell's account; but according to Pallas, in April and May: and after being cleaned, and cut transversely into pieces of a moderate size, these pieces are placed on tables, and turned three or four times a day for five or six days. In the middle of every piece they scoop a hole, through which a cord is drawn, in order to suspend them in a convenient place, but sheltered from the sun, and exposed to the air and wind; and by this practice they destroy some of the best part of the root.

The proper exsiccation of this root is certainly attended with great difficulty, and the cultivators of rhubarb in this country have not yet agreed as to the best mode of accomplishing it. The recent root, in this process, according to the experiment of sir William Fordyce, loses nearly nine-tenths of its weight; and as others say, seven-eighths. In China the roots are not dug up till winter; and the cultivators, after cleaning, scrape off the bark, and cutting them, dry the slices by frequently turning them on stone slabs, heated by a fire underneath; after which, the drying is completed by hanging them up in the air, exposed to the greatest heat of the sun. Part of the Tartarian rhubarb is carried to Turkey through Natolia; but the greatest part is conveyed by the Bucharians to Kiachta, on the Russian frontier, where it is examined by a Russian apothecary, and the best pieces only are selected and sent to Petersburg. The Chinese is conveyed to Canton, and there purchased by the agents of the East India Company.

Of the two sorts of rhubarb above mentioned, the Chinese is chiefly obtained in the province of Xenfi or Shenfee, under the name "Taihoung." It comes immediately from the East Indies, in oblong pieces, flattish on one side, and convex on the other; compact, hard, heavy, internally of a dull red colour, variegated with yellow and white; and when recently powdered, appears yellow; but on being kept, becomes gradually redder. The second is the most valuable, and is brought to us from Turkey and Russia, in roundish pieces, with a large hole through the middle of each; it is more soft and friable than the former sort, and exhibits, when broken, many streaks of a bright red colour. This sort, unless kept very dry, is apt to grow mouldy and worm-eaten; the other is less subject to these inconveniences. Some of the more industrious artists are said to fill up the worm-holes with certain mixtures, and to colour the outside of the damaged pieces with powder of the finer sorts of rhubarb, and sometimes with cheaper materials. The marks of the goodness of rhubarb are, the liveliness of its colour when cut, its being firm and solid, but not flinty or hard; its being easily pulverable, and appearing, when powdered, of a fine bright yellow colour; its imparting to the spittle, on being chewed, a deep saffron tinge, and not proving slimy or mucilaginous in the mouth. Its taste is subacid, bitterish, and somewhat styptic; the smell is slightly aromatic.

RHUBARB.

Turkey rhubarb is generally preferred to the East India sort, though the latter is more astringent, but has something less of an aromatic flavour. Tinctures made from both, with equal quantities of rectified spirit, have nearly the same taste; on drawing off the menstrua, the extract left by the tincture of the East India rhubarb proves in taste considerably stronger than the other. They seem both, says Dr. Lewis, to be the produce of the same climate, and roots of the same species of plant, taken up probably at different seasons, or cured in a different manner. Lewis's Mat. Med.

The Russian rhubarb and Turkey rhubarb, sometimes distinguished in the shops, seem to be the root of the same species of plant, grown in the same place, and prepared in the same manner; but Mr. A. T. Thomson (Lond. Disp.) inclines to believe, that the East Indian is the root of a different species, very probably of the "undulatum;" and the mode of preparation appears to be evidently different, from the aspect of the pieces.

Good Russian or Turkey rhubarb, says Mr. Thomson, has a peculiar, somewhat aromatic odour, and a bitter, slightly astringent, subacid taste; feels gritty between the teeth when chewed, and tinges the saliva of a bright yellow colour. It breaks with a rough hackly fracture, is easily pulverized, and affords a powder of a bright buff yellow colour. Water at 212° takes up 24 parts in 60; the infusion is of a brown colour, nearly clear, and reddens litmus paper. Alcohol extracts 2.7 from 10 parts, and gives a tincture of a rich golden colour, which reddens tincture of litmus; is not altered in its transparency by the addition of water; and

strikes a blackish olive hue with solution of sulphate of iron, but no immediate precipitate falls. Sulphuric ether takes up 1.5 in 10 parts of this rhubarb; the tincture is of a golden yellow hue, and when evaporated on water, leaves a thin pellicle of yellow resin, and abundance of extractive dissolved in the water, combined, however, with tannin. East Indian or Chinese rhubarb has a stronger odour, and is more nauseous to the taste than the Turkey; breaks with a more compact and smoother fracture; and affords a powder of a redder shade. Water takes up 30 parts in 60; the infusion is not so deep coloured as that of Russian rhubarb, more turbid, and reddens also litmus paper. Alcohol extracts 4 parts in 10; the tincture is of a much deeper colour, and brownish; gives a deeper red to litmus tincture; is rendered slightly turbid by the addition of water; and strikes a green, not black, olive with sulphate of iron, which it also quickly and copiously precipitates. Ether takes up 2 parts in 10; the tincture is deeper coloured, and when evaporated on water, affords the same results as the former kind, except that the compound of tannin and extractive is more soluble.

The infusion of Chinese rhubarb is more copiously precipitated by solution of isinglass than that of the Russian. Infusion of yellow cinchona throws down a copious greenish precipitate from infusion of Russian rhubarb, and a less copious, but more dense, bright yellow precipitate from that of Chinese rhubarb.

The following tables shew the effects of re-agents on the aqueous infusion of the two varieties of rhubarb.

TABLE I.—Precipitates formed by Acids, Alkalies, and Neutral Salts.

Variety of Rhubarb.	Sulphuric Acid.	Nitric Acid.	Muriatic Acid.	Oxymuriatic Acid.	Solution of Potash.	Solution of Subcarbonate of Potash.	Lime Water.	Muriate of Barytes.	Silicated Potash.
Russian.	copious, greenish-yellow.	scanty, flocculent, pale yellow.	scanty, very slowly formed, yellow.	slowly formed, pale olive.	none, but strikes a deep lake colour.	none, but strikes a reddish-brown.	scanty, slowly formed, brown.	scanty, olive-green.	none, but strikes a deep brown.
Chinese.	more copious, brownish-yellow.	less scanty, pale yellow.	scanty, quickly formed, brownish-yellow.	slowly formed, orange-yellow.	none, a deeper lake.	none, but renders it turbid, and deep reddish-brown.	copious, quickly formed, brown.	less scanty, orange-yellow.	none, but strikes a deep brown.

TABLE II.—Precipitates formed by Solutions of Metallic Salts.

Variety of Rhubarb.	Solution of Oxysulphate of Iron.	Solution of Nitrate of Silver.	Solution of Nitrate of Mercury.	Solution of Nitrate of Lead.	Solution of Muriate of Mercury.	Solution of Acetate of Lead.	Solution of Tartarized Antimony.
Russian.	copious, nearly black.	scanty, pale greenish-yellow.	copious, olive-yellow.	scanty, slowly formed, yellow.	scanty, slowly formed, pale olive.	scanty, greenish-yellow.	scanty, slowly formed, whitish.
Chinese.	copious, deep olive-green.	copious, orange-yellow.	copious, heavy, bright yellow.	scanty, slowly formed, deeper yellow.	copious, quickly formed, heavy yellow.	copious, yellow.	scanty, still more slowly formed.

RHUBARB.

When the residue, after the action of water, is digested in muriatic acid, and solution of ammonia added in excess, the liquid becomes milky, and deposits oxalate of lime. What remains consists of woody matter, a small portion of alumen, and filix. Of the specimens which we examined, one drachm of the Russian rhubarb yielded twenty-six grains of the oxalate, while the same weight of East Indian yielded only eighteen grains.

From the results of the above experiments, rhubarb appears to contain a large portion of extractive matter, a small portion of resin, mucus, tannin, gallic acid, a colouring matter, oxalate of lime, and minute proportions of alumen and filix. They shew that the two varieties differ from each other in several respects. The Russian contains more tannin, oxalate of lime, and resin; the Chinese more extractive and gallic acid. But the purgative principle is still unascertained, although it appears to be combined with the extractive, and hence is soluble in water.

The yellow colour of rhubarb, it is said, is much less destructible than many other vegetable yellows. Aqua fortis, and other acids which destroy the colour of saffron, turmeric, &c. make no change in that of rhubarb, or at most render it only turbid. Volatile spirits heighten the colour, and incline it to red. Fixed alkaline salts have this effect in a greater degree. Mr. Model affirms that a considerable quantity of selenites is contained in rhubarb. In one experiment he obtained six ounces of selenites from four pounds of rhubarb; and in the other, no less than an ounce of selenites from two ounces and five drachms of old rhubarb. Rozier's Journal for July, 1775.

Rhubarb is a mild cathartic, and commonly considered as one of the safest and most innocent of the substances of this class. Besides its purgative virtue, it has a mild astringent one, discoverable by the taste, and by its striking an inky blackness with chalybeate solutions: hence it is found to strengthen the tone of the stomach and intestines, to leave the belly soft, and to be one of the most useful purgatives in diarrhoeas, dysenteries, and all disorders proceeding from a debility and laxity of the fibres: it is frequently given with a view to this stomachic and corroborating virtue, rather than to its producing any considerable evacuations. It tinges the urine of a high yellow colour. Rhubarb in substance purges more effectually than any preparation of it: the dose is from a scruple to a drachm. From $\mathcal{O}j$ to $\mathcal{z}\mathcal{ss}$ of the powdered root opens the bowels freely; and from grs. vi to grs. x may be given for a dose, when its stomachic properties only are required. By roasting it with a gentle heat, till it becomes easily friable, its cathartic power is diminished, and its astringency supposed to be increased. The purgative virtue of rhubarb is extracted more perfectly by water than by rectified spirit; the root remaining after the action of water is almost, if not wholly, inactive; whereas, after repeated digestion in spirit, it proves still very considerably purgative: when the rhubarb has given out to spirit all that this menstruum can extract, it still imparts a deep colour, as well as a purgative impregnation, to water. A drachm of the extract, formed by inspissating the watery infusion, is not more efficacious than a scruple of the root in substance; but half a drachm of the extract, formed from the spirituous tincture, proves moderately purgative, though scarcely more so than an equal quantity of the powder. The spirituous extract dissolves almost wholly in water; and hence the tincture, like the spirituous infusions of most other vegetables, does not turn milky on being mixed with aqueous liquors: of the watery extracts scarce above one-fourth is dissolved by rectified spirit, and the part

that does not dissolve proves more purgative than that which does. Hence it appears, that rhubarb contains much more gummy or mucilaginous than resinous matter; and its purgative quality seems to reside chiefly in a combination of gummy and saline matter.

"The qualities of this root," says Dr. Cullen (Mat. Med. vol. ii.), "are that of a gentle purgative, and so gentle that it is often inconvenient by reason of the bulk of the dose required, which in adults must be from half a drachm to a drachm. When given in a large dose, it will occasion some griping, as other purgatives do; but it is hardly ever heating to the system, or shews the other effects of the more drastic purgatives. The purgative quality is accompanied with a bitterness, which is often useful in restoring the tone of the stomach, when it has been lost; and for the most part, its bitterness makes it sit better on the stomach than many other purgatives do. Its operation joins well with that of neutral laxatives; and both together operate in a lesser dose than either of them would do singly.

"Some degree of stipticity is always evident in this medicine; and as this quality acts when that of the purgative has ceased, so in cases of diarrhoea, when any evacuation is proper, rhubarb has been considered as the most proper means to be employed. I must, however, remark here, that in many cases of diarrhoea, no further evacuation than what is occasioned by the disease is necessary or proper. The use of rhubarb in substance for keeping the belly regular, for which it is frequently employed, is by no means proper, as the astringent quality is ready to undo what the purgative had done; but I have found that the purpose mentioned may be obtained by it, if the rhubarb is chewed in the mouth, and no more is swallowed than what the saliva has dissolved. And I must remark, in this way employed it is very useful to dyspeptic persons. Analogous to this is the use of rhubarb in a solution, in which it appears to me that the astringent quality is not so largely extracted as to operate so powerfully, as when the rhubarb was employed in substance."

The operation of rhubarb is quickened by the addition of neutral salts and calomel, the purgative powers of which it also reciprocally augments; so that a compound, formed of small portions of rhubarb and a neutral salt or calomel, acts with more certainty, and quicker, than large doses of either separately taken. Rhubarb is particularly adapted for the greater number of cases of diarrhoea, as it evacuates any acrid matter that may be offending the bowels, before it acts as an astringent. As a stomachic and astringent, it is usefully given in dyspepsia, hypochondriasis, and in a weakened relaxed state of the bowels, combined with ginger, nutmeg, foda, or bitters. Externally its powder is sometimes sprinkled over ulcers, to assist their granulation and healing.

Its officinal preparations are as follow: viz. *Infusum rhei*, Lond. Pharm., infusion of rhubarb, prepared by macerating for two hours a drachm of rhubarb root, sliced, with half a pint of boiling water, in a lightly covered vessel, and straining it.

Infusum rhei palmati, Edinb. Pharm., infusion of rhubarb, prepared by macerating half an ounce of bruised rhubarb root with eight ounces of boiling water, in a covered vessel, for twelve hours, and then adding one ounce of spirit of cinnamon, and straining it. These infusions differ chiefly in their strength; but that of the Edinburgh dispensatory is rendered pleasanter by the addition of the spirit. The colour of both is a reddish-brown, much deepened by the addition of alkalies. The following substances either occasion precipitation,

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precipitation, or alter the properties of this infusion, and are therefore incompatible in formulæ with it: *viz.* the strong acids and lime-water, solution of sulphate of iron, sulphate of zinc, nitrate of silver, oxy muriate of mercury, superacetate of lead, and tartarized antimony; infusions of catechu, cinchona, and cusparia.

These infusions are the best form in which rhubarb can be given, when they are intended for acting on the bowels. The dose of the former may be from ℥ʒj to ℥ʒiv, and of the latter half the quantity, united with neutral salts or aromatics, as circumstances may direct.

Extractum rhei, Lond. Pharm., extract of rhubarb, is obtained by macerating for four days, in a gentle heat, a pound of bruised rhubarb root, with a pint of proof spirit, and seven pints of water; then straining the solution, and setting it apart that the feculencies may subside. Pour off the clear liquor, and evaporate it to a proper consistence. The virtues of rhubarb are impaired during this process of inspissation, and the simple infusion is preferable. The dose is from grs. x to ʒʒ, given in the form of pills, or dissolved in peppermint water.

Tinctura rhei, Lond., tincture of rhubarb, is prepared by macerating for fourteen days two ounces of rhubarb root sliced, half an ounce of cardamom seeds bruised, two drachms of saffron, in two pints of proof spirit, and filtering. The Dublin pharmacopeia directs to take of rhubarb root sliced, two ounces; lesser cardamom seeds husked and bruised, and liquorice bruised, of each half an ounce; saffron, two drachms; and proof spirit, two pints: to digest for seven days, and then filter.

Tincture rhei palmati, Edinb., tincture of rhubarb, is prepared by digesting for seven days three ounces of rhubarb root sliced, half an ounce of lesser cardamom seeds bruised, in two pounds and a half of proof spirit, and filtering through paper.

Tinctura rhei composita, Lond., compound tincture of rhubarb, is prepared by macerating for fourteen days two ounces of rhubarb root sliced, half an ounce of liquorice root bruised, ginger root sliced, and saffron, of each two drachms, in a pint of water, and twelve fluid ounces of proof spirit, and then filtering.

Tinctura rhei et aloes, tincture of rhubarb and aloes, formerly *elixir sacrum*, or sacred elixir, Edinb., is prepared by digesting for seven days ten drachms of rhubarb root sliced, six drachms of soccorine aloes powdered, half an ounce of lesser cardamom seeds bruised, in two pounds and a half of proof spirit, and filtering through paper.

Tinctura rhei et gentianæ, tincture of rhubarb and gentian, Edinb., formerly *tinctura rhei amara*, or bitter tincture of rhubarb, is obtained by digesting for seven days two ounces of rhubarb root sliced, half an ounce of gentian root sliced, in two pounds and a half of proof spirit, and filtering through paper.

All these tinctures of rhubarb are purgative and stomachic; but they are not generally used in the first intention, on account of the strength of the menstruum, and are therefore more usually employed as adjuncts to saline purgatives, for giving them warmth, and to stomachic infusions in dyspepsia, flatulent colic, diarrhœa, the costiveness of old people, and of cold phlegmatic habits. The dose for operating as a purgative is ℥ʒvj, and from ℥ʒj to ℥ʒiij for producing their stomachic effects.

Pilulæ rhei compositæ, Edinb., compound rhubarb pills. See PILLS.

Vinum rhei palmati, Edinb., wine of rhubarb, is prepared by macerating for seven days two ounces of rhubarb root sliced, a drachm of canella bark bruised, in two ounces of

proof spirit, and fifteen ounces of Spanish white wine, and filtering through paper. This wine, when newly prepared, has the same properties, and may be applied to the same uses, as the tincture; but it is liable to undergo decomposition. The dose is from ℥ʒʒ to ℥ʒʒj, or more. Rhubarb is also an ingredient in a variety of compositions. Woodv. Med. Bot. Thomson's Lond. Disp.

The Indian rhubarb town in our gardens has this peculiar property, that it yields a fine and clear gum. This is perfectly white and pellucid, and in the months of June and July is so plentiful, that an ounce may sometimes be gathered at a time from one plant of it. It exudates of itself from all parts of the stalks and ribs of the leaves, and sometimes from the under part of the leaves themselves. It stands in some places in large drops, and in others the stalks, &c. seem only to be covered with a thin layer of it; and the under part of the leaves in some have it in form of twisted wires or long icicles. The plant may always be seen wounded by a sort of caustic in the places where the germen makes its way out, and these may be followed with any pointed instrument through the skin. In some parts of the plant this juice is found to be turned gummy within it, and looks like clear ice. As this is the only known herbaceous plant that yields a true gum like that of trees, it would be worthy of observation, whether or not some of our own plants have some tendency of nature to form a juice of the same kind. It would be most proper to look for this in the plants of the same genus, and as nearly related to the rhubarb as we can. The docks, so common about our fields, are of the same genus; and the forrel shews, by its taste, that it is particularly allied to the plant; for both are alike of the dock kind, and both alike sour. It would be proper to look carefully about the leaves of forrel a little before it flowers, to see whether any thing like the same gum appears on it.

There is yet this farther analogy between this rhubarb and our common forrel; that the husks of our forrel, boiled in water, with a little alum, turn it to a fine red colour; and the husks of rhubarb do the same, and both the one and the other often turn red in decaying.

The juice of the roots of this rhubarb, extracted by bruising and steeping it in common water, when the liquor is strained and evaporated, becomes only a clear uninflam- mable gum, and melts in the flame of a candle. This gum, as well as that of the stalks and leaves, is of an insipid taste; and it is observable, that though the plant naturally yields it in so large a quantity, yet it will not flow from wounds made by art in any part of the plant. Upon the consideration of the insipid taste of this gum, and its solubility in water, we may found some probable conjecture, in regard to the different virtues of this plant in purging and binding.

The woody fibres have a strong taste; and, in all probability, are alone endowed with the astringent quality. An infusion of rhubarb is said to purge, and a powder of it to bind: the reason is easily seen on this consideration. The water in infusion takes up all this gummy juice, and its other juices, but leaves the fibrous part behind, in consequence of which, it ought to purge without binding; but in case of giving the powder, the juices are in great part evaporated in the drying, and the woody part left almost alone; it therefore purges but little, and proves powerfully astringent. Phil. Trans. N^o 224.

RHUBARB, in *Agriculture*, a plant of the thick, fleshy, tap-rooted, perennial kind, that may in some cases be probably cultivated in the field with advantage. There are two sorts, the *common*, and the *palmated* or true kind. In the first the root strikes to a great depth, and is thick and branching, having

having roundish smooth heart-shaped leaves, and an upright strong stem, three feet in height; while, in the latter, the root is thick and fleshy, and the leaves large and palmated, having the stem five, six, or more feet in height. Besides the use of the roots as a drug, parts of the young stalks of the plants, as well as of the leaves, may be made use of, when cut, peeled, and prepared in the spring season, as an article of food.

This plant is usually raised by sowing the well ripened seed in the autumn or early spring seasons, as about September, or in February, on beds of rich, deep, well-manured earth, either in the drill or broadcast manner: the plants being afterwards kept clean from weeds, and properly thinned. But the autumn is said to be the better, as the plants are more strong for planting in the spring. When the plants have attained four or five inches in growth, they should be planted out on hills, made at the distance of four feet, by digging out the earth to the depth of three feet, and filling in with well-rotten manure, and the mould taken out, so as to raise the plants a little above the natural surface of the land. Some, however, direct that a deep, rich, well prepared soil, that is neither too moist nor too dry, should be chosen for this sort of culture, the seeds being sown upon it in the early autumn, so as to remain without transplanting, as by this means the plants suffer no check in their growth, and the roots become larger and more fair. The plants, in both modes, must be constantly kept clean and free from all sorts of weeds, and in the latter they should be set out in the different rows to the distance of six or eight inches at first, and afterwards to two or three feet, or more. When the leaves and stems decay in the autumn, the ground should be well cleaned; and in the spring, on the plants protruding, be dug well, or hoed between them. In the third year the roots will, in most cases, be in a state to be taken up for use.

Another method has been suggested for raising these plants, as being more easy, secure, and expeditious, which is by planting the off-sets, eyes, or buds, separated from the upper parts of the roots, with a small proportion of the old root, having some root fibres to them; these may be taken from the old roots of three or four years' growth. In this way a year is saved, and the plants less exposed to danger from slugs, as well as more certain in growing, less tender, and the size of the roots equal. In Mr. Hayward's practice in this mode, the off-sets were slipped from the heads of large plants in the spring, and set, by means of a dibble, at the distance of about a foot. And on further experience, when he took up his roots in the spring or autumn, he divided the head into many parts, which he planted directly at two feet distance, where intended for further removal, but if to remain for a crop, at four feet and a half.

It may be noticed, that in the culture of this root, a gentle declivity is the best situation; it should not be too much shaded, either on the south or west. But it is essential that there be a great depth and richness of soil, which is best when of the light loamy kind, and perfectly free from any stagnation of moisture. Where the situation is flat, the land is best raised into ridges or beds, with deep furrows or trenches between them.

And when the seed-stems are removed in the autumn, the crowns of the plants should be well covered over with mould, so as to form a sort of hillock, as by this means the moisture will be more effectually kept from the plants.

But where the transplanting method is practised, it is advised that great care should be taken that the nursery beds are well watered, and protected from insects, as the stronger the plants are here, the better they succeed afterwards. In

forming plantations, and filling up vacancies in them, the finest and most healthy plants are always to be made use of. Where the chief bud is destroyed, they never answer well.

The particular injuries to which these young plants are exposed, are the attacks of slugs and insects, and too much exposure to frost in their more early growth; but afterwards they are sufficiently hardy.

In general the roots are proper for being taken up about the third or fourth year, or as soon as the plants have flowered perfectly. And the autumn is the best season for the purpose, when the stems decay, when they should be well dried, cleaned, and cut into thin pieces, stringing them upon packthread, and hanging them up to dry in a gradual manner.

It has been observed by the writer of the Perthshire Agricultural Report, that it is surprising the culture of rhubarb has not claimed more attention, and been adopted on a more extensive scale, as it is calculated to bring large profits.

The palmated rhubarb has been cultivated in Sussex by the earl of Egremont, for medicinal purposes, who has it dried and cured in as good order and preservation as any imported from abroad. It is taken out of the ground in autumn, after standing seven or eight years, and then washed clean, and dried, either in the sun, or on the flue of a hot-house, after being cut into thin pieces. In using it, no difference is found between it and the foreign, and great saving might be made in this way in the importation of the article.

RHUBARB, Monk's, is a species of dock. See **RUMEX**.

The root of this plant is more astringent than rhubarb, but is much inferior in its purgative virtue, though given, as usually directed, in double its dose; nauseating the stomach, without producing any considerable evacuation. It communicates a deep yellow tincture, both to water and spirit. Lewis.

RHUBARB, White. See **MECHOACAN**.

RHUBRA, in *Ancient Geography*, a town situated on the southern coast of the island of Corsica, between the port of Syracuse and the promontory Graniacum. Ptolemy.

RHUBRICATA, a town of Hispania, in the Tarraconensis, in the country of the Lacetanians. Ptolemy.

RHUBUNA, a town of Africa, on the northern bank of the river Gira, between Artagira and Lynxama. Ptolemy.

RHUDA, a town of Asia, in Parthia, between Pafacarta and Simpsimida. Ptolemy.

RHUDDLAN, or **RHYDDLAN**, in *Geography*, a borough town in the cwmwd of Rhuddlan, cantref of Tegeing (now called the hundred of Rhuddlan), county of Flint, North Wales, is situated on the eastern bank of the river Clwyd, at the distance of five miles N. from the city of St. Asaph, and 215 miles N.W. from London. It is a town of great antiquity, and, as appears from tradition, and likewise from the remains of its castle, was a place of considerable importance in early times. A large common in the immediate vicinity was the theatre of a dreadful battle fought between the Welsh, under prince Caradoc, and the Saxons, commanded by Offa, king of Mercia. In this action the Welsh were defeated, and their leader slain; and to add to their misfortunes, Offa put to death all the men and children who fell into his hands, but spared the women. The memory of the above tragical occurrence is commemorated in a ballad called "Morfa Rhuddlan," the air of which is characterised by Pennant as being "most tenderly plaintive." This town was constituted a free borough by king

Edward I., who held a parliament here in 1284, when the statute of Rhuddlan was passed. At a private house is still shewn a "Gothic window," which is said to have been part of the building used on the occasion of these parliamentary meetings. Another house is also pointed out as having been honoured by the residence of the monarch himself during his stay at Rhuddlan, but it is more likely that he occupied the castle; and certain it is, that queen Eleanor's accouchment of a daughter occurred there in 1283. A copy of the roll of the king's expences, while at Rhuddlan, is printed in the *Archæologia*, and exhibits several interesting and curious particulars relative to the prices of provisions and labour at that early period. Rhuddlan castle is built of a reddish free-stone, and is nearly square in form. At two of the opposing corners were formerly two towers, though the other corners had only one each. Of these, the three on the north-west side of the fortrefs are tolerably entire, but the remainder is much dilapidated. By whom this castle was originally built is uncertain; some writers attributing it to Llewelin-ap-Sitfyllt, about the commencement of the 11th century, and others to Robert de Rodelent, who lived towards the close of the same century. Be this as it may, however, it was destroyed by Gruffydd-ap-Crinan in the reign of Henry II., and was subsequently re-erected and fortified by that monarch. In 1399 it was seized and garrisoned by the earl of Northumberland, previous to the deposition of the unfortunate king Richard II., who dined here on his way to Flint castle. During the civil wars between king Charles I. and his parliament, Rhuddlan castle was at first occupied by the royalists, but, after a short siege, the garrison were forced to surrender to the parliamentary troops, commanded by general Mytton. This event happened in July 1646, and in the following December, the fortrefs was dismantled by order of parliament. It was surrounded by a deep ditch, and had an additional one on the north side: both of these ditches are still remaining. The walls are very strong, and well calculated for defence. South from the castle is a fortification, commonly supposed to have been constructed by the parliamentary troops as a battery during the siege above-mentioned; but though it may have been used for that purpose, it is doubtless of much higher antiquity. Near this spot formerly stood a house of Black friars, which must have been founded previous to 1268, as it is recorded, that in that year, Anian de Schonan, one of its priors, was made bishop of St. Asaph. It suffered greatly in the wars between king Edward I., and prince Llewelin ab Gruffydd; but it recovered and subsisted till the reign of Henry VIII. when it was dissolved, and its buildings granted to Henry ap Harry. Tanner states that there was another religious house in the immediate vicinity of Rhuddlan, as old as the year 1281, but no traces of its site can now be discovered.

Edward I., in his charter constituting Rhuddlan a borough, appointed the constable of the castle mayor, and ordered that two bailiffs should be chosen annually, as his assistants, from among the burgeses. Since the time of Oliver Cromwell, there having been no constable, there has consequently been no mayor, so that the bailiffs are now the chief officers of the town. The burgeses contribute towards the new election of a representative in parliament for the borough of Flint. The voters must either inhabit the town itself, or that part of the parish called Rhuddlan Franchise, which extends to the distance of a mile. At present no regular market is held here, but there are fairs for cattle on the 2d of February, 25th of March, and the 8th of September. The parish, according to the par-

liamentary returns of 1811, contains 131 houses, and 831 inhabitants.

The river Clwyd, upon which Rhuddlan is situated, is only navigable for vessels of about twenty tons burden as high up as the town; but about two miles below it is a port, into which vessels of considerable magnitude can enter and remain with security. Carlisle's *Topographical Dictionary of Wales*, 4to. 1813. Pennant's *Tour in Wales*, 1770, Lond. 2 vols. 4to. 1778.

RHUDEN, or RUTHEN, a town of Germany, in the duchy of Westphalia; 64 miles E. of Duffeldorp.

RHUDIANA, in *Ancient Geography*, a country of Asia, in Carmania. Ptolemy.

RHULA, in *Geography*, a town of Saxony, in the principality of Eifenach, famous for its manufacture of knives; four miles S.S.E. of Eifenach.

RHUMB, RUMB, or *Rum*, in *Navigation*, a vertical circle of any given place; or the intersection of a part of such a circle with the horizon.

Rhumbs, therefore, coincide with *points* of the world, or of the horizon.

And hence the mariners distinguish the rhumbs by the same names as the points and winds. But we may observe, that the rhumbs are denominated from the points of the compass in a different manner from the winds: thus, at sea, the north-east wind is that which blows from the north-east point of the horizon towards the ship in which we are; but we are said to sail upon the north-east rhumb, when we go towards the north-east.

They usually reckon 32 rhumbs, which are represented by the 32 lines in the rose, or card, of the compass.

Aubin defines a rhumb to be a line on the terrestrial globe, sea-compass, or sea-chart, representing one of the 32 winds which serve to conduct a vessel. So that the rhumb a vessel pursues is conceived as its route, or course.

Rhumbs are divided and subdivided like points. Thus, the whole rhumb answers to the cardinal point. The half rhumb to a collateral point, or makes an angle of 45° with the former. The quarter rhumb makes an angle of $22^{\circ} 30'$ with it. And the half-quarter rhumb makes an angle of $11^{\circ} 15'$.

Sometimes navigators divide the 32 points into four quarters, and call the rhumb next the east the first rhumb, the next to that the second rhumb, &c.

For a table of the rhumbs, or points, and their distances from the meridian, see *WIND*.

RHUMB-Line, *Loxodromia*, is a line prolonged from any point of the compass in a nautical chart, except the four cardinal points; or it is the line which a ship, keeping in the same collateral point, or rhumb, describes throughout its whole course. See *LOXODROMY*.

The great property of the rhumb-line, or loxodromia, and that from which some authors define it, is, that it cuts all the meridians under the same angle.

This angle is called the *angle of the rhumb*, or the loxodromic angle.

The angle which the rhumb-line makes with any parallel to the equator, is called the *complement of the rhumb*.

An idea of the origin and properties of the rhumb-line, the great foundation of navigation, may be conceived thus: a vessel beginning its course, the wind with which it is driven makes a certain angle with the meridian of the place; and as it is supposed, the vessel runs exactly in the direction of the wind, it makes the same angle with the meridian which the wind makes.

Supposing then the wind to continue the same, as each point

point or instant of the progress may be esteemed the beginning, the vessel always makes the same angle with the meridian of the place where it is each moment, or in each point of its course, which the wind makes.

Now a wind, *e. gr.* that is north-east, and which, of consequence, makes an angle of 45° with the meridian, is equally north-east, wherever it blows, and makes the same angle of 45° with all the meridians it meets. A vessel, therefore, driven by the same wind, always makes the same angle with all the meridians it meets with on the surface of the earth.

If the vessel sail north and south, it makes an angle infinitely acute with the meridian, *i. e.* it is parallel to it; or rather fails in it. If it run east and west, it cuts all the meridians at right angles.

In the first case, it describes a great circle; in the second, either a great circle, *viz.* the equator, or parallel to it. If its course be between the two, it does not then describe a circle; since a circle, drawn in such a manner, would cut all the meridians at unequal angles, which the vessel cannot do.

It describes, therefore, another curve, the essential property of which is, that it cuts all the meridians under the same angle. This curve is what we call the *loxodromic curve*, *rhumb-line*, or *loxodromy*.

It is a kind of spiral, which, like the logarithmic spiral, makes an infinity of circumvolutions without ever arriving at a certain point, to which it yet still tends, and towards which it approaches at every step.

This asymptotic point of the rhumb-line is the pole: at which, were it possible for it to arrive, it would find all the meridians conjoined, and be lost in them.

The course of a vessel then, except in the two first cases, is always a rhumb-line; which line is the hypotenuse of a right-angled-triangle, whose two other sides are the ship's way or distance run in longitude and latitude. Now, the latitude is usually had by observation, and the angle of the rhumb, with one or other of the two sides, by the compass. See LATITUDE, and COMPASS.

All, therefore, that is required by calculation in sailing, is the value of the length of the rhumb-line, or the distance run.

But as such curve line would prove very perplexing in the calculation, it was necessary to have the ship's way in a right line; which right line, however, must have the essential property of the curve line, *viz.* to cut all the meridians at right angles. See CHART.

If PA, PF, PG, &c. (*Plate II. Navigation, fig. 5.*) be supposed meridians, AI the equator, and EB, KL, MN, parallels; AO will represent a rhumb-line, which makes equal angles with the meridians, and consequently different from those made by a great circle, which cuts the meridians at unequal angles; whence it follows that the rhumb is not a great circle of the sphere. If a ship, therefore, be at first directed towards E, and constantly persist in the same rhumb, it will never arrive at the place E, but at the place O, which is farther from the equator AI.

Hence, as on the surface of a sphere the shortest way between A and O is an arc of a great circle between A and O; the rhumb-line is not the shortest way, or least distance from one place to another.

RHUMB-Lines, Use of the. 1. If the meridians PA, PB, PC, PD, &c. (*fig. 6.*) be not very far apart, the rhumb-line A IHG is divided by the equidistant parallels LE, MF, NG, &c. into equal parts.

Hence, 1. The parts of the rhumb AI and AG are as

the latitudes AL and AN of the places A and G. 2. Since the arcs AB, IK, HF, are equal in magnitude, and therefore unequal in number of degrees; the sum of the arcs, called the *latus mecodynamicum*, or *miles of longitude*, is not equal to the difference of longitude AD of the places A and G.

2. The length of the rhumb-line AG is to the change or difference of latitude GD, in the same ratio as the whole sine to the co-sine of the angle of the rhumb.

Hence, 1. The rhumb failed on being given, together with the difference or change of latitude, turned into miles, the length of the rhumb-line, or the distance from the place A to the place G upon the same rhumb, is had by the rule of three. 2. The rhumb being given, together with the quantity of the ship's way on the same rhumb, *i. e.* the length of the rhumb AG; the difference of latitude DG is had, by the rule of three, in miles, to be converted into degrees of a great circle. 3. The difference of latitude DG being given in miles, as also the length of the rhumb-line AG, the angle of the rhumb, and consequently the rhumb failed on, is had by the rule of three. 4. Since the co-sine of an angle is to the whole sine, as the whole sine to the secant of the same angle; the difference of latitude GD is to the length of the rhumb-line AG, as the whole sine to the secant of the angle of the rhumb.

3. The length of the rhumb-line, or of the ship's way in the same rhumb, AG, is to the *latus mecodynamicum* or *mecodynamic side* AB + IK + HF, as the whole sine to the sine of the loxodromic angle GAP.

Hence, 1. The rhumb, or angle of the rhumb, being given; as also the ship's way in the same rhumb-line AG, the *mecodynamic side* is had, by the rule of three, in miles, *i. e.* in the same measure in which the length of the rhumb is given. 2. In like manner, the *mecodynamic side* AB + IK + HF being given, as also the rhumb-line or ship's way AG, the rhumb failed is found by the rule of three.

4. The change of latitude GD is to the *mecodynamic side* AB + IK + HF; as the whole sine to the tangent of the loxodromic angle PAG or AIB.

Hence the rhumb or loxodromic angle PAG, and the change of latitude GD being given, the *mecodynamic side* is found by the rule of three.

5. The *mecodynamic side* AB + IK + HF is a mean proportional between the aggregate of the rhumb AG, and the change of latitude GD, and their difference.

Hence the change of latitude GD, and the rhumb-line AG being given in miles, the *mecodynamic side* is found in the same measure.

6. The *mecodynamic side* AB + IK + HF being given, to find the longitude AD.

Multiply the change or difference of latitude GD by six, which reduces it into parts of ten minutes each; divide the *mecodynamic side* by this product, and the quotient gives the miles of longitude, answering to the difference of latitude in ten minutes; reduce these miles of longitude in each parallel into differences of longitude from a loxodromic table, and the sum of these is the longitude required.

7. If a ship sail on a north or a south rhumb, it describes a meridian; if on an east or west rhumb, it describes either the equinoctial, or a parallel to it. Wolfii Elem. Math. tom. iv. cap. 11.

1. To find the rhumb between two places by calculation, or geometrically, we have two canons, or proportions: the first, as the radius is to the co-sine of the middle latitude, so is the difference of longitude to the whole departure from the meridian, in the course between the two places proposed.

The second, as the radius is to the half sum of the co-lines of both latitudes, or (rather for geometrical schemes) as the diameter is to the sum of the co-lines of both latitudes, so is the difference of longitude to the departure from the meridian. For the application of these principles, see SAILING.

RHUN, PULO, in *Geography*. See POOLARON.

RHUNE, a river which rises in the New Forest, and runs into the Seine; two miles N.W. of Nordheim.

RHUS, in *Botany*, an ancient name, *ῥῶς*, or *ῥῶς*, of the Greeks, generally supposed of doubtful etymology. De Theis deduces this, and many similar words, which have a reference to a red colour, from the Celtic *rhudd* or *rub*, red. Hence, according to him, we have not only *Rubia*, but *Rosa*. The fruit of the original *ῥῶς* of Dioscorides, *Rhus Coriaria*, well justifies this explanation. — Linn. Gen. 146. Schreb. 197. Willd. Sp. Pl. v. 1. 1477. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc. Sibth. v. 1. 206. Pursh 204. Ait. Hort. Kew. v. 2. 161. Juss. 369. Lamarek Illust. t. 207. Gært. t. 44. — Class and order, *Pentandria Trigynia*. Nat. Ord. *Dumosea*? Linn. *Terebinthaceæ*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, in five deep, erect, permanent segments. Cor. Petals five, ovate, moderately spreading. Stam. Filaments five, very short; anthers small, shorter than the corolla. Pist. Germen superior, roundish, as large as the corolla; styles scarcely any; stigmas three, heart-shaped, small. Peric. Berry roundish, of one cell. Seed solitary, roundish, bony.

Obs. Some species have dioecious flowers.

Ess. Ch. Calyx in five deep segments. Petals five. Berry superior, with one seed.

An extensive shrubby or arboresecent genus, whose species are found in North America, Japan, China, the Cape of Good Hope, and a few in the south of Europe. Their qualities are of a caustic nature, in certain instances highly virulent, whence some species have acquired the name of Poison-trees. Others are celebrated for producing valuable resins for varnish. Willdenow has collected together the characters of thirty-three species; but many of them he had not seen, particularly those found by Thunberg at the Cape. The genus is divided into three sections, by the structure of the leaves, of which we shall give a few examples. Pursh has two species not in Willdenow. Twenty-one are cultivated in the English gardens. Aiton.

Section 1. *Leaves pinnate*. Thirteen species, to which the two described by Pursh are to be added; see hereafter.

R. Coriaria. Elm-leaved Sumach. Linn. Sp. Pl. 379. Willd. n. 1. Ait. n. 1. Sm. Fl. Græc. Sibth. t. 290, unpublished. Woodv. Med. Bot. t. 261. Ger. Em. 1474. (*Rhus*; Matth. Valgr. v. 1. 195.)—Leaves pinnate; leaflets oval, bluntly serrated, downy beneath; their common stalk winged in the upper part.—Native of the Levant. Frequent in our gardens and shrubberies, ever since the days of Gerard, (though less common than the American *R. typhinum*;) flowering in July, and retaining its dense, branched, ample, upright clusters, of deep-red, rough, coriaceous berries, even till winter, after the leaves are fallen. The tree is of a dwarf bushy habit, with spreading, ascending, round, downy branches, of a soft spongy texture. *Leaves* from eight inches to a foot long, of about five pair of leaflets, with an odd one; paler, downy, and veiny beneath. *Flowers* greenish, each with a large hoary germen, which becomes a globular, crimson, hairy berry, the size of an Elder-berry. The taste of this fruit is very acid and astringent. It has

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been used in Greece, from the most remote antiquity, for tanning leather; as have also the leaves, to the present day. Both have likewise been employed in medicine, either for their tonic or cooling qualities, nor do they appear to possess any of the dangerous qualities for which some species of this genus are remarkable. Dr. Woodville's figure of this plant ought to have been quoted in Hort. Kew. as not cited by Willdenow, and being moreover an English publication.

R. javanicum. Java Sumach. Linn. Sp. Pl. 380. Willd. n. 3. Ait. n. 3. Thunb. Jap. 121.—Leaves pinnate, ovate, pointed, serrated; very downy and soft beneath.—Native of Japan, flowering in September. Introduced into the faves at Kew, by Sir Joseph Banks, in 1799. The branches, and all the stalks, as well as the backs of the leaves, are clothed with extremely soft, dense, velvet-like pubescence, as is the upper side of the foliage in some degree. Each leaf has three pair, with an odd one, of stalked, ovate, taper-pointed leaflets, strongly serrated, and about an inch and a half long. *Flowers* very small, in long, slender, lax, simple, axillary clusters.

R. glabrum. Smooth Sumach. Linn. Sp. Pl. 380. Willd. n. 4. Ait. n. 4. Pursh n. 2. Kalm's Travels, v. 1. 66. 75. (*R. virginicum*, paniculâ sparsâ, ramis patulis glabris; Dill. Elth. 323, t. 243, f. 314.)—Leaves numerously pinnate, lanceolate, serrated, smooth on both sides; glaucous beneath.—Common in North America, flowering in July and August, nor is it rare in our shrubberies. Kalm says that neglected corn-fields are soon overrun with this tree, whose roots subsequently render ploughing the ground very difficult. The leaves consist of from eight to twelve pair of longish taper-pointed leaflets, smooth and naked on both sides. The fruit much resembles the first species in colour and mode of growth, but is less hispid. According to Mr. Pursh, the *R. elegans*, Ait. Hort. Kew. n. 5. Willd. n. 5, is only a variety of this, with dioecious flowers, and a more scarlet-coloured fruit.

R. viridiflorum. Green-flowered Sumach. Lamarek Dict. v. 7. 504. Pursh n. 3. (*R. canadense*; Mill. Dict. ed. 8. n. 5.)—Leaves numerously pinnate, ovate-lanceolate, serrated; glaucous, and somewhat downy beneath. Clusters erect.—On the edges of woods in dry sunny situations, in Pennsylvania and Virginia, flowering in July and August. This is one of the species added by Mr. Pursh, after Poirêt in Lamarek, but not without a doubt of its being distinct from the last. We can find no important difference in a specimen from the French gardens, except that the leaflets are rather more ovate. The flowers are yellowish-green. *Leaves* not always downy.

R. punilum. Dwarf Poison Sumach. Michaux Boreal-Amer. v. 1. 182. Pursh n. 4.—Leaves numerously pinnate, oval, scarcely pointed, deeply toothed; downy beneath. Branches and footstalks downy. Fruit clothed with velvet down.—Native of Upper Carolina, flowering in July. The stem is not above a foot high. This species is unknown in our gardens. Mr. I. Lyon, who gathered it, assured Mr. Pursh, that it was the most poisonous of the genus, he having been "poisoned all over his body, and lamed for a considerable time," in consequence of collecting the seed.

R. Vernic. Varnish Sumach. Linn. Sp. Pl. 380. Willd. n. 6. Ait. n. 6. Pursh n. 5. Kalm's Travels, v. 1. 68. 77. (*Toxicodendron, foliis alatis, fructu rhomboide*; Dill. Elth. 390, t. 292, f. 377.)—Leaves pinnate, very smooth, as well as the branches; leaflets elliptical, entire, somewhat abrupt, pointed. Clusters compound, lax. Flowers dioecious. Fruit polished.—Found in low copses, from Canada to Carolina, flowering in July. *Pursh*. It has been in

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our gardens for a century past, but is not common. Kalm speaks of its dangerous effects, to various persons, whose skin, and whole body, in some cases, are affected with inflammation, swelling and pain, in consequence of their touching any part of this tree, or exposing themselves to its effluvia; whilst others, even of the same family, can cut or handle it with impunity. Kalm himself was generally unhurt by this poison, but on one occasion he did not entirely escape its effects. The whole tree is very smooth. *Leaflets* about six pair with an odd one. *Berries* the size of a pea, white and remarkably polished, both in a fresh and dry state. Miller contended that this was the same with the true Varnish-tree of Japan, described in Kämpfer's *Am. Exot.* 791. t. 792; which opinion was combated by Ellis, in the *Philosophical Transactions*, n. 112. We believe the latter to be in the right. The two trees, indeed, seem very nearly akin, but the *leaflets* in Kämpfer's plate are broader than those of the American plant, nor does his description of the fruit exactly answer. Yet Thunberg calls the Japanese plant *Rhus Vernix*. Nothing seems to be known in America, as to the tree in question affording any varnish, though that point is certainly worth enquiry, considering its near relationship, at least, to one whose produce is so valuable. Kämpfer speaks of the poisonous effects of the effluvia of his varnish-tree, like what we have related of the other.

Section 2. *Leaves ternate or quinate*. Eighteen species. *R. Toxicodendron*. Trailing Poison-oak, or Sumach. Linn. Sp. Pl. 381. Willd. n. 17. Ait. n. 11. Pursh n. 7. (*Edera trifolia canadensis*; Cornut. *Canad.* 96. t. 97. *Barrel.* Ic. t. 228.) β . *R. radicans*; Linn. Sp. Pl. 381. Willd. n. 16. Ait. n. 10. Kalm's *Travels*, v. 1. 67. 177. (*Toxicodendron triphyllum glabrum*; Duham. *Arb. v. 2.* 341. t. 98.)—Leaves ternate; leaflets stalked, ovate, angular, cut, or crenate. Stem creeping.—Common in woods, fields, and hedges, from Canada to Georgia, flowering in June and July. *Pursh*. We readily concur with Mr. Pursh, in considering these two Linnæan species as mere varieties. The leaves when young are more downy beneath, in some instances than in others; but that character, as well as their notches, is certainly variable. We speak with confidence on this subject, having been at no small trouble formerly, to determine which was the plant recommended in paralytic and rheumatic complaints, by some eminent physicians in England and France; and after much examination, finding no certain or permanent difference between the two. Kalm speaks of the poisonous qualities of the present species, as like those of *R. Vernix*; but it had no effect on him, even when he made the rash experiment of dropping the juice into his eye. The stem never grows erect, but when it meets with support, will climb, like ivy, to the tops of the loftiest trees. The *leaflets* are of a broad, ovate, or rhomboidal form, pointed, always more or less downy, at least about the ribs, and sometimes quite covered with soft down at the back; their margin occasionally almost entire, but most generally, in the downy variety, strongly crenate, cut, or lobed. *Flowers* in compound axillary clusters, greenish, dioecious. *Berries* white. Both varieties have long been known in our gardens, but have nothing to recommend them to general culture, even were they unexceptionable as to danger.

R. tomentosum. Woolly-leaved Cape Sumach. Linn. Sp. Pl. 382. Willd. n. 24. Ait. n. 15. (*Vitex trifolia minor indica ferrata*; Commel. *Hort. v. 1.* 179. t. 92.)—Leaves ternate; leaflets stalked, rhomboid, somewhat angular; white and very downy beneath.—Native of the Cape of Good Hope. It was introduced very early by the Dutch, into the European gardens, but we know not whether it has been preserved, or noticed, though an extremely handsome

evergreen shrub, the backs of whose leaves are elegantly white and downy, with reddish veins. We know nothing of the flowers or fruit. Commelin mistook this plant for the East Indian *Vitex trifolia*.

Several other three-leaved species of *Rhus*, from the Cape, elegant evergreen shining-leaved shrubs, are cultivated in our more curious collections, as may be seen in Aiton. We subjoin one species to this section, which Willdenow has not admitted here.

R. pentaphyllum. Five-leaved Morocco Sumach. *Defont.* *Atlant. v. 1.* 267. t. 77. (*Rhamnus pentaphyllus*; Jacq. *Obf. fasc. 2.* 17. Linn. *Syst. Veg. ed. 14.* 233. *R. ficulus*; *Syst. Nat. ed. 12. v. 3.* 229. *R. ficulus pentaphyllos*; *Bocc. Sic. 43. t. 21.*)—Leaves ternate or quinate; leaflets linear-lanceolate, dilated upwards, obtuse, nearly smooth; cut or undivided. Stem thorny.—Native of uncultivated hills in Morocco and Sicily. A thorny shrub, or small tree, with numerous, round, smooth, grey branches. *Leaves* alternate, stalked, digitate, of from three to five narrow-wedge-shaped, obtuse leaflets, above an inch long; somewhat downy when young; either quite entire, or unequally toothed, sometimes pinnatifid. *Flowers* pale yellow, in axillary compound clusters, dioecious. *Berry* red, resembling hawthorn, but with three tubercles at the top; its flavour slightly acid, not unpleasent. The bark is used for tanning, and for dyeing red. *Desfont.*

Section 3. *Leaves simple*. Two species.

R. Cotinus. Venice Sumach, or Coccygria. Linn. Sp. Pl. 383. Willd. n. 32. Ait. n. 21. Jacq. *Austr. t. 210*, *Coggyria Theophrasti*, and *Cotinus coriarius Plinii*; *Ger. Em. 1476.* *Cotinus*; *Duham. Arb. v. 1. t. 78.*)—Leaves simple, obovate, or orbicular.—Native of Austria, Switzerland, Italy, and Greece, in hilly situations. Common with us in plantations, for the sake of the very singular and ornamental appearance of its elongated feathery fruit-stalks. The stem is bushy, the height of a man. *Leaves* smooth, orbicular, entire. *Flowers* greenish, small, in terminal compound panicles. *Fruit* gibbous. The leaves and stalks, when bruised, have an aromatic but pungent and acid scent. The whole plant is used for tanning in Italy, and called *Scotino*; see Smith's *Tour*. The wood is much used by the modern Athenians, according to Dr. Sibthorp, for dyeing wool of a most beautiful and rich yellow.

R. atrum. Black Sumach. *Forst. Prodr. 23.* Willd. n. 33.—“Leaves simple, ovate-oblong. Flowers polygamous.”—Found by Forster in New Caledonia. A shrub or tree. We know nothing more of this species, the only one, except *Cotinus*, with simple leaves.

RHUS, in Gardening, contains plants of the tree and shrub kinds, sumach and toxicodendron; of which the species cultivated are, the elm-leaved sumach (*R. coriaria*); the stag's-horn Virginian sumach (*R. typhinum*); the scarlet sumach (*R. glabrum*); the Carolina sumach (*R. elegans*); the lentiscus-leaved sumach (*R. copallinum*); the Venice sumach (*R. cotinus*); the trailing poison-oak, or sumach (*R. toxicodendron*); the varnish sumach (*R. vernix*); the rooting poison-oak, or sumach (*R. radicans*); the woolly-leaved sumach (*R. tomentosum*); the narrow-leaved sumach (*R. angulifolium*); and the shining-leaved sumach (*R. lucidum*).

The branches in the first sort are used instead of oak bark for tanning leather, and it is said that Turkey leather is all tanned with this shrub.

In the third sort there are several varieties; as the New England sumach, in which the stem is stronger, and rises higher than that of the second sort; the branches spread more horizontally, they are not quite so downy, and the down

RHUS.

down is of a brownish colour; the leaves are composed of many more pairs of leaflets, and are smooth on both sides: the flowers are disposed in loose panicles, and are of an herbaceous colour. The Canada smooth red sumach, which has smooth branches of a purple colour, covered with a grey pounce; the leaves are composed of seven or eight pairs of leaflets, which are four inches and a half long, and one inch broad in the middle, terminating in acute points, and a little serrate, of a lucid green on their upper surface, but hoary on their under, and smooth: panicle large, composed of several smaller, each on separate footstalks, the whole covered with a grey pounce; the flowers are of a deep red colour.

In the sixth sort the root is used for dyeing: the leaves and young branches dye black; and the bark is used for tanning leather.

In the eighth species Martyn says, that the milky juice stains linen a dark brown. The whole shrub is, in a high degree, poisonous; and the poison is communicated by touching or smelling any part of it.

The ninth species having, in common with ivy, the quality of not rising without the support of a wall, tree, or hedge, it is called in some parts of America creeping ivy. It will climb to the top of high trees in woods, the branches every where throwing out fibres that penetrate the trunk. When the stem is cut, it emits a pale brown sap of a disagreeable scent, and so sharp, that letters or marks made upon linen with it cannot be got out again, but grow blacker the more it is washed. Like rhus vernix it is poisonous to some persons, but in a less degree. Kalm relates, that of two sisters, one could manage the tree without being affected by its venom, whilst the other felt its exhalations as soon as she came within a yard of it, or even when she stood to leeward of it, at a greater distance; that it had not the least effect upon him, though he had made many experiments upon himself, and once the juice squirted into his eye; but that on another person's hand, which he had covered very thick with it, the skin, a few hours after, became as hard as a piece of tanned leather, and peeled off afterwards in scales.

There is a variety with a straight and stout trunk, having a brownish ash-coloured bark: the leaves smooth, veined, bright green above, somewhat paler underneath, pendulous, and somewhat bent back: in the male plant the leaves are rather wider and longer, and are drawn more to a point; in the female they are shorter and blunter, and the petioles are reddish, whereas in the others they are green: the flowers axillary, in racemes; the males larger, whitish-yellow; the females smaller, herbaceous, on the germ instead of the style there are two, sometimes three black dots: fruits round, the size and form of coriander seeds, streaked with five lines, remaining on the tree till new flowers come out; when the outer rind comes off, and a cretaceous substance comes into view, in which an ash-coloured, hard, horny seed is involved, slightly divided on the upper part, and somewhat kidney-shaped.

Method of Culture.—The first nine sorts of these plants are capable of being raised by seeds and layers, and some of them also by suckers, or their rooting branches. In the first method such of them as do not send up suckers should have the seed procured from abroad, and sown in pots of a large size, or in beds of light mould, being covered in about the depth of half an inch in the autumn. Those in pots should be protected from the frosts during the winter, and if plunged in a moderate hot-bed in the early spring, they will be rendered more forward, letting the plants have a free air when they appear. Those in the open ground often remain long before they vegetate; they should be kept free from

weeds, be well watered in summer, and have the protection of mats the first winter. When the plants have had the growth of a year or two, they may be planted out in nursery-rows till fit to be set out in the places where they are to remain. The potted plants should have the protection of the frame the second winter, air being freely admitted in mild weather; and in the spring following they may be shaken out of the pots without injuring the roots, and be set out in nursery-rows, three feet apart, and a foot distant in the rows, where they may remain two years, and then be planted out where they are to remain.

Such sorts as have young branches sufficiently low, may have them laid down in the slit method; when they will mostly have stricken root in the course of a year, and may be taken off and planted out where they are to remain, or in the nursery.

And all those sorts that send up suckers from the roots should have them taken up during the winter, and planted out in nursery rows, in the manner of the seedlings, till of a proper growth to be planted out.

The seventh and ninth sorts may likewise be increased by their trailing branches, which have stricken root as they rest on the ground, which should be taken up with their roots entire in the autumn, winter, or in early spring, and be planted out, either where they are to remain, or in nursery rows, till of sufficient growth for the purpose they are intended.

The first and fourth sorts, being the most tender, require the most sheltered situations.

Most of these plants afford a milky juice, which is extremely acrid and corrosive.

The three last sorts may be raised by cuttings and layers with great facility. In the first method, the cuttings of the young shoots should be planted out in pots of light fresh mould, in the spring and early summer months, plunging them in a moderate hot-bed, where they readily strike root, being occasionally watered and shaded: and when they have formed good roots, they may be potted off into separate pots. And in the latter mode, any of the young wood may be laid down in the usual manner, in the early spring, when by the autumn they will mostly have stricken good root, and may be taken off, and be potted out the same way as the cuttings.

All the first nine sorts have a fine effect in mixture with other deciduous shrubby plants, in the borders, clumps, and other parts of pleasure grounds, and the three last afford variety among other potted greenhouse plants of the less tender kinds.

RHUS Cobbe, in *Botany*. See *SCHMIDELIA*.

RHUS, in the *Materia Medica*. This genus comprehends a variety of species, which are known to be poisonous; but the *rhus coriaria*, or elm-leaved sumach, is perfectly innocent, and its leaves have been used occasionally for culinary purposes. Its medicinal qualities are owing to its stypticity or astringency, which property renders it useful in dyeing, and also in tanning of leather, to which purpose it was applied in the time of Dioscorides. The leaves and berries have been used in medicine; but the leaves are more astringent and tonic, and have been commonly employed in complaints which indicate remedies of this class. The berries, which are of a red and compressed figure, contain a pulpy matter, in which is lodged a brown, hard, oval seed, manifesting a considerable degree of astringency. The pulp, even when dry, is gratefully acid, and has been found to contain an essential salt similar to that of wood-sorrel, or perhaps more nearly allied to crystals of tartar. An infusion of the dry fruit is not blackened by a solution of iron,

so that it appears to be destitute of altringency; but its acidity is very grateful, and hence the French have called it "le vinaigrier." Like many other acid fruits, these berries, which in eastern countries are used as a pickle, may be advantageously taken to allay febrile heat, and to correct bilious putrefecency. The *rhus toxicodendron* and *radicans* have of late been recommended in paralytic affections; the latter by M. Frenoi, and the former by Dr. Alderson of Hull: but the cases in which these virulent plants were employed are but few and indecisive. They excite, however, a sense of heat and pricking, and irregular twitches in the affected limbs. It is suggested that some advantage has been derived from their use in herpetic eruptions. The dose of the powdered leaves may be gr. fs, given twice or thrice a day, and gradually increased to grs. iv, in the form of a bolus. The stems of the toxicodendron, when cut or broken, exude a milky juice, which inflames the skin wherever it touches, and becomes black when it is exposed for a short time to the action of atmospheric air. This juice forms an indelible black stain on linen cloth, and is used in Japan, where it is a native, as a varnish. (Phil. Transf. vol. xlix. p. 158. See VARNISH.) The leaves are inodorous, and their taste is mawkish and subacid. Their virtues are completely extracted by water, and partially by alcohol. The aqueous infusion reddens litmus paper; precipitates the solution of iron black, that of nitrate of silver brown, and throws down a precipitate with gelatine. Hence it contains gallic acid and tannin; but its effects chiefly depend on a narcotic principle. Woodv. Med. Bot. Thomson's Lond. Disp. See SUMACH and TOXICODENDRON.

RHUSELNIUM, in *Botany*, a name given by some authors to the ranunculus.

RHUSTICANA, or RUSTICANA, in *Ancient Geography*, a town of Hispania, in the interior of Lusitania, between Talebriga and Mendeculia. Ptolemy.

RHUSUNCORÆ, or RUSUCURRUM, a town of Africa, in Mauritania Cæsariensis. Ptolemy. It had the title of a Roman colony.

RHUTHYN, or RUTHIN, in *Geography*, a borough and market-town in the cwmwd of Llannerch, cantref of Dyffryn-Clwyd, (now called the hundred of Rhuthyn,) county of Denbigh, North Wales, is situated on the slope of a considerable hill, which rises near the centre of the delightful vale of the Clwyd, at the distance of 205 miles N.W. from London. This town, from the etymology of its name, appears to have derived its origin from a castle, called Rhyddin, or the red fortrefs, in allusion to the colour of the stone of which it is constructed. Although there was probably a walled fortrefs here anterior to the reign of king Edward I., yet the last castle erected here was most probably by this monarch. Camden, however, assigns its origin, as well as the town, to a baron named Roger Gray. Its history affords only a few events worthy of notice. In the year 1400 Owen Glyndwr attempted to take it by assault, but was unsuccessful; so that after pillaging the inhabitants, and setting fire to the town, he retreated precipitately to the mountains. In the reign of king Charles I. it was garrisoned in the royal cause, till about the middle of April, A.D. 1646, when it was compelled to surrender, after having sustained a siege of two months. Not long subsequent to that period, it was dismantled by order of parliament, and has since gradually fallen into its present ruinous state; only a few fragments of walls remaining to mark its site and character.

Rhuthyn is described as having been formerly a populous town, and as possessing the best market of any in the vale. This pre-eminence, however, is now lost; though it is yet

a respectable and flourishing place, containing, according to the parliamentary reports of 1811, 271 houses, and a population of 1292 persons. The government is vested in two aldermen and sixteen common council-men, chosen annually in the lord's court. The number of burgesses is unlimited. Rhuthyn is a borough both by prescription and by charter, and joins with Denbigh in returning a representative to the national senate. It has two markets, weekly; one on Saturday for provisions, and another on Monday for corn, &c.; besides which, there are six annual fairs. The lordship of Rhuthyn, a manorial right belonging to the Middleton family of Chirk-Castle, comprises three comots, viz. Coleigon, Dogfeilyn, and Llannerch; and is distinct with respect to government from the hundred, the lord appointing a steward to it. Here is a free-school of equal, if not greater, celebrity than any other in North Wales. It was founded and endowed by Gabriel Goodman, D.D., who was dean of Westminster in the reign of queen Elizabeth. His descendant, Godfrey Goodman, was likewise a benefactor to the town. From this school young men are sometimes admitted into orders, without having graduated at any university. It has two masterships, the head one of which is in the gift of Jesus college, Oxford. The town-hall is situated near the market-place, and is fitted up with apartments for holding the hundred courts, the county assizes, and the quarter sessions; which last are held alternately here and at Denbigh. The new gaol is a handsome and commodious building, erected according to designs furnished by Mr. Joseph Turner. The debtors' apartments and those of the felons are divided by a lofty wall; and both have spacious yards, with baths, attached to them. The church is a large structure of considerable antiquity. It was originally conventual, having been attached to a religious house of the order of monks denominated Bonhommes. In the year 1310, however, it was made collegiate by John de Gray, who placed in it a chapter of seven regular canons, and conferred upon them considerable landed possessions, and numerous privileges. The apartments for the canons were connected with the church by a cloister, of which a portion is still remaining, converted into a residence for the warden of an hospital, which was founded and endowed by Gabriel Goodman, the founder of the free-school, as an asylum for twelve decayed housekeepers, viz. ten men and two women. The warden is *ex officio* rector of the parish of Rhuthyn, and has, besides, the government of the free-school. The interior of the church is much admired, and particularly its roof, which is a very curious piece of workmanship, consisting of small squares, adorned with various sculptures, and bearing the names of the different workmen employed in their formation. The collegiate establishment here was dissolved at the period of the general suppression, when its lands were granted to William Winlove and Richard Fyld. There are no remarkable monuments in this church, excepting that of Dr. Gabriel Goodman, which displays a bust of the deceased, in marble. The doctor was a native of Rhuthyn, where he was born in 1583. He was successively advanced to be canon of Windsor, dean of Rochester, and bishop of Gloucester. See Fuller's Church History, book xi. Worthies, and Chalmers's General Biographical Dictionary.

The vicinity of Rhuthyn presents some objects worthy of notice. At a short distance from the town is the neat village of Llanrhydd, which is noted for the fine sculptural monuments and decorations in its church. Near this village is the Bathafarn, anciently a feat belonging to the lord Gray; and more to the south-west lie Pool-Park and Bachymbyd, both seats of the lord Bagot. Stretching towards

wards the north is the vale of Clwyd, which is deservedly celebrated by all travellers. Commencing at Rhuthyn, it extends not less than twenty-four miles in length, and from six to eight in breadth, exhibiting a rich scene of cultivation, happily blended with many of those objects which constitute the picturesque. On a small eminence in this vale stands the village of Llan-Rhaiadar; and near it is a well, called Ffynnon Ddyfnog, which is much esteemed by the inhabitants for its medicinal quality in the cure of rheumatism. The church here is an elegant structure in the pointed style, and has a beautiful east window, ornamented with stained glass. The subject is the root of Jesse, who is represented as extended upon his back, with the genealogical tree issuing from his loins, comprising all the kings of Israel and Judah, down to the birth of Christ. Above is an outline rose, including an eye surrounded with a radiance, and another rose of Lancaster to correspond; which last emblem indicates that the work was executed after the accession of Henry VII. to the throne. Here is a splendid but tasteless monument to the memory of Maurice Jones, esq., who founded an alms-house in this parish, A.D. 1720; and in the church-yard is a striking instance of genealogical vanity, in an inscription to the memory of John ap Robert, whose pedigree is traced up to Cadel, king of Powis. Carlisle's Topographical Dictionary of Wales, 4to. 1813. A Tour in South Wales, by the Rev. W. Bingley, 8vo. 1801. Penant's Tour through Wales, 1770, 2 vols. 4to.

RHYAS, from *ῥῆν*, to flow, in Surgery. See RHŒAS.

RHYDDA, in *Ancient Geography*, a town of Palestine, belonging to the Arabs, according to Josephus.

RHYME, RHIME, *Ryme*, or *Rime*, in Poetry, the similar sound or cadence and termination of two words which end two verses, &c.

Or, rhyme is a similitude of sound between the last syllable or syllables of one verse, and the last syllable or syllables of a verse succeeding either immediately, or at a distance of two or three lines.

Rhyme is a modern invention, and the product of a Gothic age; Milton calls it the *modern bondage*. Yet some authors will have it, that the English, French, &c. borrow their rhyme from the Greeks and Latins. The Greek orators, they say, who endeavoured to tickle the ears of the people, affected a certain cadence of periods, which ended alike, and called them *επιρροιαί*. The Latins, who imitated them, called these chiming terminations, *similiter desinentia*.

This affectation increased as the Latin tongue declined; so that, in the later Latin writers, scarcely any thing is more common than rhyming periods.

The French, and from them the English, &c. adopted this cadence of rhyme, which seemed to them more pretty and agreeable than the metrical verses of the Greek and Roman poets.

This kind of Latin poetry in rhyme was much in vogue in the twelfth century; and the verses thus running were called Leonine verses, for what reason Camden owns he does not know (for a lion's tail, says he, does not answer to the middle parts, as these verses do); but, doubtless, they had their name from a French monk of St. Victor at Mar-seilles, about the year 1135, called Leoninus, who first composed them with success, and of whom we have several pieces in them remaining, addressed to pope Adrian IV. and Alexander III. It is certain, however, (says Dr. T. Warton, Hist. of English Poetry, vol. i.) that rhymed Latin verses were in use at a much earlier period. Pelloutier (Mem. sur la Lang. Celt. part i. vol. i. ch. 12.) has given a very early specimen of Latin rhymes, occurring in

the beginning of the seventh century. Latin rhymes seem to have been first used in the church hymns, but Leonine verses are properly the Roman hexameters or pentameters rhymed, and it is not improbable, that they had their name from the above-mentioned monk, who was the most popular, and almost only Latin poet of his time in France. He wrote many Latin pieces not in rhyme, and in a good style of Latin versification. The early French troubadours mention a sort of rhyme in their vernacular poetry partly distinguished from the common species, which they call Leonine or Leonime.

Camden has given us a collection of Latin rhymes of our ancient English writers; among whom, Walter de Mapes, archdeacon of Oxford, in the time of king Henry II. makes a principal figure, especially for two pieces, the one in praise of wine beginning,

“ Mihi est propositum in taberna mori,
Vinum sit appositum morientis ori;
Ut dicant, cun venerint, angelorum chori,
Deus sit propitius huic potatori.”

The other against the pope, for forbidding the clergy to have wives, beginning,

“ Prisciani regula penitus cassatur,
Sacerdos per *hic* et *hec* olim declinatur;
Sed per *hic* solummodo nunc articulatur,
Cum per nostrum præfulum *hec* amoveatur.”

Since the restoration of learning in the sixteenth century, attempts have been made to banish rhyme out of the modern poetry, and to settle the English and French verses on the footing of the ancient Greek and Latin ones, by fixing the quantities of the syllables, and trusting wholly to those, and to the numbers or measure.

This Milton has done, with great success, in his Paradise Lost, and other pieces; and after him Philips, Addison, and some others. Verses of this kind we call *blank verses*. See VERSE.

The French have attempted the same, but not with the same success. Jodelet made the first essay, and after him Pasquier; but they both failed. Pafferat and Rapin followed them, and failed, like them. Their hexameter and Sapphic verses were neither imitated nor approved; and the cadence of rhyme was generally preferred to quantity, or the use of long and short syllables. Des Portes, likewise, made some essays of verses, constructed of long and short lines, without rhyme, but the attempt only served to convince the world, that this kind of measure is inconsistent with the genius of the French tongue.

To succeed in such kind of verses, there must be a liberty of varying the order of the words, or of changing their situation, as may best suit the occasions of the poet; of making the substantive either go before or follow after the verb, as the verse requires, &c. Now none of the modern tongues will admit of such an arbitrary situation of the words, equally with the ancients; yet none will allow this more than the English, nor any less than the French.

The principal defect in rhyme is the full close which it forces upon the ear at the end of every couplet; and in this respect it is far inferior to *blank verse*; (which see.) Besides, the constraint and strict regularity of rhyme are unfavourable to the sublime, or to the highly pathetic strain.

An epic poem, or a tragedy, would be fettered and degraded by it. It is best adapted to compositions of a temperate strain, where no particular vehemence is required in

the sentiments, nor great sublimity in the style; such as pastorals, elegies, epistles, satires, &c. To these it communicates that degree of elevation, which is proper for them, and, without any other assistance, sufficiently distinguishes the style from prose. He who should write such poems in blank verse, would render his work harsh and unpleasing. In order to support a poetical style, he would be obliged to affect a pomp of language unsuitable to the subject. Dr. Blair farther observes, that though he coincides in opinion with those, who think that rhyme finds its proper place in the middle, but not in the higher regions, of poetry, can by no means join in the invectives which some have poured out against it, as if it were a mere jingling of sounds, fit only for children, and owing to nothing but the corruption of taste in the monkish ages. Rhyme might indeed be barbarous in Latin or Greek verse, because these languages, by the sonoroufness of their words, by their liberty of transposition and inversion, by their fixed quantities and musical pronunciation, could carry on the melody of verse without its aid. But it does not follow, that it must, therefore, be barbarous in the English language, which is destitute of these advantages. Rhyme was barbarous in Latin; and an attempt to construct English verses, after the form of hexameters and pentameters, and Sapphics, is as barbarous among us. It is not true, that rhyme is merely a monkish invention. On the contrary, it has obtained under different forms in the versification of most known nations. It is found in the ancient poetry of the northern nations of Europe; and it is said to be found among the Arabs, the Persians, the Indians, and the Americans. This shews, that there is something in the return of similar sounds, which is grateful to the ears of the greatest part of mankind. And if any one, after reading Mr. Pope's Rape of the Lock, or Eloisa to Abelard, shall not admit our rhyme, with all its varieties of pauses, to carry both elegance and sweetness of sound, his ear must be pronounced to be of a very peculiar kind.

The present form of our English heroic rhyme in couplets is a modern species of versification. The measure generally used in the days of queen Elizabeth, king James, and king Charles I., was the stanza of eight lines, such as Spencer employs, borrowed from the Italian; a measure very constrained and artificial. Waller was the first who brought couplets into vogue; and Dryden afterwards established the usage. Waller first smoothed our verse; Dryden perfected it. Mr. Pope's versification has a peculiar character. It is flowing and smooth in the highest degree; far more laboured and correct than that of any who went before him. He introduced one considerable change into heroic verse, by totally throwing aside the triplets, or three lines rhyming together, in which Mr. Dryden abounded. Dryden's versification, however, has great merit; and, like all his productions, has much spirit mixed with carelessness. If not so smooth and correct as Pope's, it is however more varied and easy. He subjects himself less to the rule of closing the sense with the couplet, and frequently takes the liberty of making his couplets run into one another, with somewhat of the freedom of blank verse. Blair's Lect. vol. iii. See VERSE.

Rhymes are either *single*, or *double*, or *triple*, though the two last are now much disused.

RHYMES, *Single*, are divided into perfect or whole rhymes, and imperfect or half rhymes. A *whole* or *perfect* rhyme is where there is a similitude of sound without any difference; or where a thorough identity of sound appears in the pronunciation of the two syllables, notwithstanding that there may be some difference in the orthography. A *half* or im-

perfect rhyme is where there is a similitude, with a difference either in respect of the pronunciation, or the orthography, but chiefly the former.

RHYME, *the feminine*, is that where the last syllable of the rhyme ends with an *e* mute, or quiescent, as in *dove*, *belle*, &c.

RHYMES, *Masculine*, are those of all other words.

Ménage observes, that the masculine rhymes close the periods better; but the feminines, being the softer and more languishing, end more agreeably, especially in mournful subjects.

RHYMES, *Double*, by the French called *rich* rhymes, are those where the two words terminate alike through the whole two last syllables, as *squabble* and *rabble*, &c.

RHYMES, *Plain*, are those where the two rhyming verses succeed immediately to each other.

RHYMES, *Cross*, are those where the verses are so disposed, as that the first rhymes with the third, and the second with the fourth, &c.

RHYMES, *Affonant*. See ASSONANT.

RHYMNICI MONTES, in *Ancient Geography*, mountains of Scythia, on this side of Imaus, in which the river Rhyrnus had its source. The mouth of this river was in the Caspian sea, between that of the river Rha and that of the river Daïs.

RHYNBECK, or RHINBECK, in *Geography*, a post-town of America, in Dutchess county, New York, on the E. side of Hudson's river, opposite to Kingston; 103 miles N. of New York. The township is bounded S. by Clinton, and N. by Beckman. A curious cavern has been discovered, in 1792, at a place in this town, called by the Indians Sepafcot.

RHYNCHÆ, in *Ancient Geography*, a country of Greece, in the isle of Eubœa. Steph. Byz.

RHYNCHOSPORA, in *Botany*, so called from $\rho\upsilon\chi\sigma\sigma$, a beak, and $\sigma\pi\omicron\sigma\zeta$, seed; because the permanent base of the style forms a beak to the seed.—Vahl. Enum. v. 2. 229. Brown Prodr. Nov. Holl. v. 1. 229. Ait. Hort. Kew. v. 1. 127.—Class and order, *Triandria Monogynia*. Nat. Ord. *Calamaria*, Linn. *Cyperaceæ*, Brown.

Eff. Ch. Glumes chaffy; the lower ones empty. Corolla none. Seed one, crowned with the hardened permanent style, whose base is as broad as the seed.

Vahl, the founder of this genus, describes nineteen species, among which are *Schoenus albus* and *fuscus* of Linnæus, and Sm. Fl. Brit. Mr. Brown adopts it, adding to the character, that "the seed is accompanied at its base by toothed bristles, shorter than the glumes." He remarks, that it differs from *DICHROMENA*, (see that article,) in having these bristles. This writer defines three New Holland species, one the *R. aurea* of Vahl, and other two non-descripts. The inflorescence is said to be very various, some species having the flowers panicled, whilst in others they are either corymbose, or capitate. We do not see the necessity of establishing this genus; at least, as it concerns the British Flora, we beg leave to suspend our opinion. See SCHOENUS.

RHYNCSIA, from $\rho\upsilon\chi\sigma\sigma$, a beak, because the keel terminates in a long sharp point.—Loureir. Cochin. 460. Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Eff. Ch. Corolla papilionaceous. Keel rhomboid, beaked. Legume membranous, with two seeds.

1. *R. volubilis*.—Found wild near Canton in China. Stem herbaceous, round, twining. Leaves ternate, roundish, downy. Flower-stalks axillary, in pairs, many-flowered. Calyx two-lipped. Corolla yellow. Seeds black and shining.

In so difficult a tribe, we dare not answer for the permanency of this genus, not having seen a specimen. The plant may possibly be known to botanists, under some other name and genus.

RHYNCOTHECA, from *ῥυγχος*, a beak, and *θηκη*, a capsule, on account of its beaked or pointed seed-vessel. De Théis Glossaire de Botanique, 402. Fl. Peruv. 71.

RHYNDACUS, in *Ancient Geography*, a river of Asiatic Mysia, according to Pomponius Mela, who places its source in mount Olympus. According to Pliny it had been denominated Lycus.—Also, a town of Asia, between Phrygia and the Hellespont. Steph. Byz.

RHYNE, in *Botany*, a name used by some authors for the camphor tree.

RHYPÆ, **RIFE**, or *Rhyphes*, in *Ancient Geography*, a town of the Peloponnesus, in Achaia, the territory of which was denominated Rhypidis. According to Strabo it was N. of Helice, and at some distance from the coasts of the gulf of Corinth. Pausanias says that in his time they could only perceive the ruins of Rhyphæ, 30 miles from Ægium. Homer calls this town Répe.

RHYPARA, an island situated near that of Samos. Pliny.

RHYPTICS, **RHIPTICS**, *ῥηπτικός*, in *Medicine*, detergent remedies, or cleansers. See **DETERGENT**.

RHYSSADIUS, in *Ancient Geography*, a mountain of Africa, in Lybia interior, in which Ptolemy places the source of the river Stachir.

RHYSTROM, in *Geography*, a river of Holstein, which runs into the Elbe at Gluckstadt.

RHYTHM, **RHYTHMUS**, *ῥυθμός*, in *Music*, the variety in the movement, as to the quickness or slowness, and length and shortness, of the notes.

Or the rhythmus may be defined, more generally, the proportion which the parts of a motion bear to each other.

In *ancient poetry* rhythm or rhythm denotes the measure of the feet, or the number and combination of long and short syllables, called also *metre* and *quantity*.

A continued motion in every organized body that is capable of rhythm, is susceptible of some kind of measure. This measure marks the several parts of motion, and enables us to judge of their proportions. It is to point out these proportions that the Greeks, among many other terms, have made use of *ῥυθμός*, *rhythm*, which they have applied to different purposes. They have not only expressed by it the kind of cadence, or vibration of the wings, in the flight of birds; the movement of the feet in the progressive motion of animals; and the gestures, figures, and steps of dancers; but every species of regular motion, such as is observable in the beating of the pulse, and in respiration. They have even abused the original import of the word so far as to apply it to things absolutely motionless and inanimate; such as works in painting and sculpture, in which they have called that symmetry and just proportion which reigns in all the parts by the name of rhythm.

But the most common application of this term has been to express the *time* or duration of many sounds heard in succession; whether these sounds are musical, and such as are produced by voices and instruments, or without any determinate tone, as in the strokes of a hammer upon an anvil; in the beating of a drum; and in the articulations of the voice in common speech, in repeating poetry, or pronouncing an oration.

But our enquiries here shall be confined to that species of rhythm, which more particularly concerns melody, and which merits discussion the more, on account of its great

importance in music, and of the darkness in which it is usually involved by writers on the subject.

From the strict union of poetry and music among the ancients, which seem to have been almost inseparable, an offence against time or rhythm was unpardonable, as it not only destroyed the beauty of the poetry, but sometimes even the meaning of the words of which it was composed.

Τὸ πᾶν παρὰ μουσικῆς ὁ ῥυθμός, say the Greeks; it was the principal point in their music, without which they regarded melody as wholly unmeaning and lifeless. Hence Plato refused the title of musician to every one who was not perfectly versed in rhythm, as we should now to a bad *timeist*. It is of such importance, that, without it, music can have no power over the human passions. Pythagoras, according to Martianus Capella, used to call rhythm, in music, the *male*, and Melos the *female*; and Doni has compared rhythm with *design*, in painting, and Melos to *colouring*. It is certain that an ordinary melody, in which the time is strongly marked, and the accents are well placed, has more effect than one that is deficient in those particulars, though more refined and uncommon, and set off with all the richness of harmony, and learning of modulation.

Isaac Vossius, in his Dissertation “De Poematum Cantu, et viribus Rhythmi,” has attributed to rhythm all the miraculous powers of ancient music.

As vocal music was chiefly cultivated among the ancient Greeks, the first part of these rhythmical observations shall be confined to lyric poetry.

Aristides Quintilianus defines musical rhythm *συστήμα ἐκ χρόνων κατὰ τινὰ τάξιν συνημιμένον*; “the assemblage of many parts of time, which preserve a certain proportion with each other;” which, since the use of bars in music, may be called aliquot parts of a measure, or a given portion of time. For the better understanding of this definition, it is necessary to remember that the music in question was constantly sung to verses, the words of which were all composed of *long* and *short* syllables; that the short syllable was pronounced as quick again as the long, and the short syllable being regarded as one part or portion of this measure, the long was equal to two; so that, consequently, the sound which was applied to the long syllable, was equal in duration to two such sounds as were sung to short syllables, or, in other words, that one note was equal to two portions of time, and the other to one. It must likewise be remembered that the verses thus sung, were composed of a certain number of feet, formed by these long and short syllables differently combined, and that the rhythm of the melody was regulated by these feet; as, whatever was their length, they were always divided into two parts, equal or unequal, the first of which was called *ἀρση*, *elevation*, and the second *θραση*, *depression*. A *foot* in poetry seems to answer to a *bar* in music. A *time*, among the ancients, was a proportion of that foot or bar; as, with us, a bar is divided into accented and unaccented parts. In like manner the rhythm of the melody, corresponding with these feet, was divided into two parts, equal or unequal, which we now call the *down* and *up* parts of a bar, expressed by *beating down* the hand or foot, and *lifting it up*. Thus far concerns *vocal* rhythm; what follows belongs to *instrumental*.

As the notes of the ancient music were constantly written over each syllable of the verses which were to be sung; as the quantity of each of these syllables was perfectly known to musicians; and as the duration of each sound was regulated by the syllables; it did not seem necessary that the time should be marked by any particular sign or character. However, for the ease and convenience of the musician, a
canon,

RHYTHM.

canon, or rule, was given of the rhythm at the beginning of a lyric poem. This canon consisted of nothing but the numbers 1 and 2, that is, the alpha and beta of the Greek alphabet, disposed according to the order of the breves and longs which composed each verse, and divided according to the number of its feet. The alpha, or unit, marked a breve, because it contained only one portion of time; and the beta, or binary, marked a long, being equal to two portions. Some of these poetical, or rhythmical canons, are still to be found in the Manual of Hephæstion.

Rhythm in Latin was called *numerus*; and this term, in process of time, was extended to the melody itself, subjected to certain numbers or rhythms, as appears from this line of Virgil:

“Numeros memini, si verba tenerem :”

“If I knew the words, I could remember the tune well enough.”

The Romans had signs for rhythm, as well as the Greeks; and these signs were not only called *numerus*, but *æra*, that is, *number*, or the mark for time. *Numerata nota*, says Nonius Marcellus. In this sense we find the word used in a verse of Lucilius:

“Hæc est ratio? perversa æra? summa subducta improbè?”

“Do you call that settling accounts? such a confusion of figures? and the sum falsely cast up?”

Though the word *æra* was at first only applied by musicians to the time, or measure of the melody, they afterwards made the same use of it as of *numerus*, to express the tune or melody itself; and it has been thought that the word *air*, or, as the Italians call it, *aria*, which includes a certain piece of music of a peculiar rhythm, or cadence, is derived from *æra*.

Such was the manner in which the ancients marked the measure in their written music; but to make it still more sensible in the execution, they beat time in several different ways. The most common was by the motion of the foot, which was lifted up and beat down alternately, according to what we call common, or triple time. To regulate the time was generally the office of the music master or director, called *μεσοχορος* and *κορυφαίος*, *coryphaeus*, because he was placed in the middle of the orchestra, among the musicians, and in an exalted and conspicuous situation, in order to be seen and heard the more easily by the whole band.

The directors of the time were likewise called in Greek *ποδοκτυποι* and *ποδοφοδοι*, from the noise of their feet. In Latin they were called *pedarii*, *podarii*, and *pedicularii*, for the same reason. Their feet were generally furnished with wooden or iron sandals, in order to mark the time in a more distinct manner; these implements the Greeks called *κρηπίδα*, *κρηπίτα*; and the Latins *pedicula*, *scabella*, or *scabilla*, because they resembled little pattens, or clogs.

But it was not only with the feet that the ancients beat the time, but with all the fingers of the right hand upon the hollow part of the left; and he who marked the time or rhythm in this manner, was called *manu-ductor*. For this purpose they sometimes used oyster-shells, and the shells of other fish, as well as the bones of animals, in beating time, as we do of castanets, tabors, &c. Both Hesychius, and the scholiast of Aristophanes, furnish passages to confirm this assertion. What a noisy and barbarous music! All rhythm, and no found. The drums and sistrums of the Idæi Dactyli could not have been more savage.

Many ancient instruments were monotonous, and of little use, but to mark the measure; such were the cymbalum and

sistrum; and it was for this reason, perhaps, that the cymbal was called *æra*, by Petronius. But it would afford us no very favourable idea of the abilities of modern musicians, who should require so much parade and noise in keeping together. The more time is beat, says M. Rousseau, the less it is kept; and, in general, bad music, and bad musicians, stand most in need of such noisy assistance.

However, if any thing like the power which ancient music is said to have had over the passions can be credited, it must have derived this power chiefly from the energy and accentuation of the rhythm. Aristides Quintilianus gives a long list of different metres, with their several properties of calming or agitating the mind, according to the nature of the syllables, or feet of the verses, as well as the sentiments which they were intended to express; and as it will afford the reader an opportunity of seeing how much stress was laid on this part of music, and how fanciful and ideal many of the distinctions seem to have been, we shall give the whole passage in English.

“Measure, which begins by a *down part* of the metrical division, is calm and gentle; whereas that which begins by an *up part*, expresses trouble and agitation. Full time, that is, always accompanied with melody, is noble in its effect; and that arising from catalectic verses, deficient in a syllable or note, if it be supplied by a rest or pause, has more simplicity. Time of equal proportions, is graceful; and that of odd numbers, or sesquialterate proportion, is more proper to excite commotion. Double time is a kind of mean betwixt the graceful and the turbulent. Among the movements of two even notes, if they are short, their effect is lively, impetuous, and proper for military dances, called *Pyrrhics*, in which the dancers are armed; and time, of which the movement is regulated by poetic feet composed of long syllables, is more grave, serious, and fit for hymns which are sung in honour of the gods, at festivals, and in sacrifices; the measure composed of a mixture of long and short notes, participates of the qualities of both these last mentioned.

“Among the duplicate proportions, the Iambic and Trochaic have the most vivacity and fire, and are peculiarly proper for dancing. Those called *σβηιοι* and *σημαντοι*, of which the arsis answers to two long syllables, are full of dignity. Compound measures are more pathetic than simple; and such as are confined to one genus, move the passions much less than those which pass from one genus to another.”

After giving these characteristics of time, Aristides proceeds to prove their reality and foundation in nature, by drawing a parallel between some particular species of rhythm, and the gait and actions of man. He pretends, for instance, “that the motion which answers to the Spondaic measure, is a sign of moderation and fortitude; that Trochaic, or Pæans, indicate a greater degree of fire and vivacity; that the Pyrrhic has something low and ignoble in it; that an irregular velocity implies dissoluteness and disorder; and finally, that a movement resulting from all these, is wild and extravagant.”

With respect to the excellence and effects of ancient music, it is very difficult to steer between the extremes of credulity and scepticism. Such enthusiasts as Aristides Quintilianus, by asserting too much, have thrown a ridicule upon the subject, and inclined us, perhaps, to believe too little. The simplicity of ancient melody, and its slavish dependence upon poetry, may probably have given birth to some of these fancies.

In addition to the account already given of the poetic feet under their respective articles, we shall here introduce a short

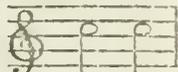
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short description of each as they more immediately relate to music, at the same time rendering our dissertation on rhythm more complete.

A poetical foot consists of a certain number of syllables, which constitutes a distinct part of a verse, as a bar does of an air in music. An hexameter verse consists of six of these feet, a pentameter of five.

The Spondee, Iambus, Trochee, and Pyrrhic or Periambus, are disyllabic feet, or of two syllables each.

The Spondee consists of two long syllables, as *vertunt*. --



An Iambic foot has one short and one long syllable. *Θεῶ, λεγῶ. potens, amas.* --



return.

The Trochee has one long and one short syllable, as *gratus, musa.* --



silent.

The Pyrrhic, or Periambus, two short syllables, as *mare, probus.* --



quiver.

The Dactyl, Anapæst, Molossus, Tribrach, Bacchius, Antibacchius, Amphibrachys, and Creticus, are trisyllabic, or of three syllables. To some of these we have no equivalents; however, the Dactyl, consisting of one long

and two short syllables -- is very com-



mon in our language, as *tenderly, hastily*; and we have verses composed of dactyls as well as the Greeks and Romans:

*Mÿ | bānks thëy wëre | fūrnīsh'd with | beēs,
Whōse | mūrūr's in- | vite öne tö | fleöp.*

These may be compared with the following celebrated passages in Homer and Virgil, where the sound is manifestly, and intentionally, an *echo to the sense*. Homer (*Odyssey*, book xi.) after he has described in labouring Spondees the slow and painful manner in which Sisyphus rolled the stone up hill, makes use of nimble Dactyls in describing its swift descent:

Δύθι; ἑπιτάῳ πείδονθι κύλινδον ἄλαξ; ἀγιάθης.

And Virgil, lib. viii. v. 596, describes, in pure Dactyls, the galloping of the horse:

“----- It clāmōr, ἔt, āgmīnē fāctō
Quādrūpēdāntē pūtrēm sōnitū quatīt ūngūlā cāmpūm.”

The Anapæst has two short and one long syllable; as

sapiens, recubans, --



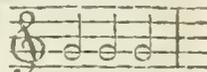
Isaac Vossius,

“De Viribus Rhythmi,” p. 56, has said, that the French have no Dactyls, nor the English a perfect Anapæst in their language. Let the French speak for themselves; but as to our own part of the charge, it is easily confuted by the mere mention of the words *recommend* and *disappoint*.

We shall enumerate the rest of the poetic feet of the

ancients, merely to shew what resources they had in varying their melody by different combinations of two kinds of notes.

The Molossus has three long syllables, ---



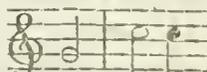
The Tribrach, three short, ---



The Bacchius, which is the reverse of the Dactyl, has one short, and two long syllables; ---



The Antibacchius, two long and one short, ---



Amphibrachys, one short, one long, and one short, or one long between two short, ---

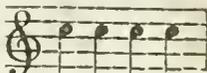


Creticus, one short between two long, ---

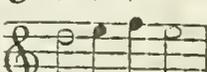


The quadrisyllabics are compounded of feet already mentioned.

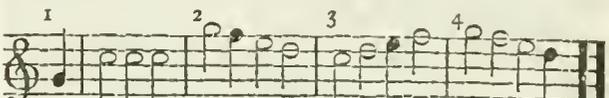
The Proceleusmaticus is composed of four short syllables, or of two Pyrrhics, ---



The Choriambus, two short between two long, or the junction of the Trocheus and Iambus, ---



Epitrite; of this foot there are four species: 1. The Iambus and Spondee ---; 2. The Trochee and Spondee ---; 3. The Spondee and Iambus ---; and 4. The Spondee and Trochee ---.



The Pæan or Pæon, which is the contrary of this last, consists of one long syllable, and three short: ---, ---, ---, ---.

Servius reckons more than a hundred different kinds of verse among the Latins; and, according to Hephæstion, the number was still more considerable among the Greeks; consequently their melody might have been varied in as many different ways. There is not, however, the least appearance of the ancients having had in their vocal music that kind of measure which we call pointed; nor did they admit rests in the middle of a verse, though at the end of catalectic, or broken verses, the finger was allowed to make up the deficiency by a silence, equivalent to a rest in modern music; and though they had so great a variety of feet in their poetry, many of those already instanced are unfit for modern melody.

“After all the researches,” says Dr. Burney, “which I have been able to make, it must be acknowledged that the subject of ancient music, in general, still remains, and probably ever will remain involved in much difficulty and uncertainty. It is fortunate, however, for those who wish to view as near as possible this dark angle of antiquity, that the prospect happens to be the clearest just in that part where all its admirers assure us it is best worth examining;

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For however ignorant we may be of the melody of ancient music, the rhythm, or time of that melody, being regulated entirely, as has been already observed, by the metrical feet, must always be as well known to us as the prosody and construction of the verse; so that we have nothing to do but to apply to the long and short syllables any two notes, one of which is double the length of the other, in order to know as exactly as if we heard, in what manner any particular kind of metre was set by the ancients with respect to time and cadence, that boasted rhythm, which we are so often told was *every thing* in their music. It may, therefore, afford some gratification to the curiosity of those who have never considered the poetry of the ancients in this point of view, if I produce a few examples, which will, perhaps,

help to throw a little light upon the *dramatic* music of the Greeks, and give some idea of the rhythmical resources of the *poet-musician* in one of the most interesting provinces of his art.

“The first example shall be of the Iambic verse, which chiefly prevails in the Greek tragedies, and in which the dialogue and soliloquy, indeed all but the chorus and ode, were generally written. I shall content myself with applying notes of correspondent lengths to the syllables, and marking the time; leaving the melody to the imagination of the reader. Should I presume to supply it, I might expect to be reproached as another Salmoneus for my temerity.

“Demens! qui nimbos et non imitabile fulmen, &c.”

This measure, when pure and unmixed, consisted of six Iambic feet, as,

ε̄quēs | s̄onān|tē v̄r|bērā|bīt ūn|gūlā.

Such verses, however, seldom occur. The laws of this metre only required that the second, fourth, and last feet should be Iambics; in the other places, Spondees, Anapaests, and Dactyls, were admitted. This metre answers to our Alexandrine, or verse of twelve syllables; but more exactly in the *number* and *kind* of feet, than in its cadence, or general effect upon the ear. The pause after the third foot, so essential to a melodious Alexandrine, has no place but by accident, in the Iambic, which runs more swiftly, and has a more prosaic effect. This, undoubtedly, led the ancients to measure it *per dipodium*, or by *double feet* (see Hor. Art. Poet. v. 252. *pes citus: unde, &c.*), which answer to double bars in modern music. Ariosto wrote some comedies in this Iambic measure. One of his lines will, perhaps, be as exact a representation of the ancient Iambic as can be produced, in point of cadence.

Per dio son qua|si in pensier di | tornarmene.

The following Alexandrine of Spenser may also serve for the same purpose.

“So in his angry courage fairly pacified.”

The above Greek lines are the beginning of the Hecuba of Euripides, and were sung by the ghost of Polydorus. The bars in the verse are only to shew how the ancients divided it into three portions of two feet in each; but the bars of time, the thesis, or beat, must always fall in the middle of the foot: ~ | ♪ | ♪. For the sake of distinguishing the feet more clearly, Dr. Burney barred them singly; though it would have been more conformable to the ancient manner

of scanning this kind of verse, and probably more expressive of its cadence and *effect*, to have made but three bars in each line. The Iambics of Greek comedy differ from these only in a little more liberty of construction; those of the Roman, in Plautus and Terence, are so licentious, as often not to differ perceptibly from prose, even in the judgment of Cicero himself: “propter similitudinem sermonis, sic sæpe sunt abjecti, ut nonnunquam vix in his numerus et versus sentiri possit.” Orator, cap. 55.

Besides this metre, the dialogue admitted, occasionally, Trochaic verses. They are generally introduced in scenes of hurry and disorder; being, as Aristotle has described them, and as their name implies, a voluble and *dancing* measure. A character which the reader will not be inclined to dispute, when he compares the ancient Trochaic with a measure exactly corresponding to it in our own language, but which we have not yet admitted into our tragedy.

Πε̄ρ ὄν εἶπός, ὅ; σέφουγέ | τῆ μὲν ἐν δόμων ξιζῶ; ;

This is a pure Trochaic, and is precisely in the measure of our

“Jolly mortals fill your glasses,
Noble deeds are done by wine.”

The whole difference is, that the ancient Trochaics were written in one line; but this is merely to the eye; for they really consist of two verses; the last syllable of the *fourth* foot being, as Dr. Burney believes, constantly, the end of a word.

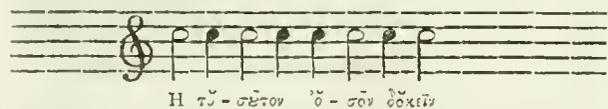
Mr. West, in his translation of the “Iphigenia in Tauris” of Euripides, has given a whole scene of Trochaics in the correspondent English measure. A single line of the original, with his translation, will be a sufficient example of Trochaic rhythm.

Such

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Such were the metres appropriated to the dialogue of the ancient tragedy, and such must have been the rhythms or times of the music to which they were set.

We shall close these observations with one example more, taken from the *choral* part of the drama, that part which was more particularly *musical*, and the circle marked out for the musician, where all the magic of his art, with all the wonders of rhythm, were to be displayed. Of the metre of this part, we shall only observe, in general, that it seems to have admitted of such an unbounded variety in the mixture and arrangement of feet, and to have been fettered by so few restraints, that, to a modern ear, it is frequently not to be distinguished from a smooth and elegant prose. We can therefore be certain of nothing, concerning the music applied to the ancient chorus, except the *relative lengths* of the notes as they are determined by the prosody: in what manner the ancients divided them by beats, we do not even presume to guess; and we believe it may be proposed to the musical reader as a problem, worthy, for its difficulty at least, if not for its importance, to exercise his sagacity, how the following specimen should be *barred*, in order to render it as little tormenting to the ear as possible.



The most striking circumstance in all these examples, is the perpetual change of time, occasioned by the mixture of unequal feet. To the eye, indeed, the recitative of the old French opera presents a similar appearance; but where no strict time is observed, the changes are less perceptible to the ear. No circumstance relative to ancient music has been more frequently and triumphantly opposed to the modern, in proof of superiority, than its inviolable adherence to the *fixed quantity* of syllables. It is, perhaps, equally difficult to disprove this, and to conceive how such a music could be rigorously executed, without throwing both the hearers and performers into convulsions. If, however, this was the case,

we need no longer wonder at the noisy expedients, to which the ancients had recourse in beating time; for we believe the best modern band would find it difficult, if not impossible, to keep exactly together in the execution of a Greek chorus, though assisted by all the clatter of an ancient coryphæus.

Upon the whole, perhaps, even the imperfect view which we have here attempted to give of the rhythmical resources of ancient music, may be sufficient to warrant something more than a doubt, whether, after all that Isaac Vossius, and many others, have said, a *fixed prosody*, and the rigorous, unaccommodating length of syllables, be any recommendation of a language *for music*; that is, whether a music formed and moulded closely upon such a language, must not necessarily be cramped and poor, in comparison of that free, unshackled variety; that independent range of rhythmical phrase, which constitutes so considerable a part of the riches of *modern music*. Let the most inventive composer try to set half a dozen Hexameters, pure Iambics, or any other verses that will fall into regular common or triple time, and he will soon find that no resources of melody are sufficient to disguise or palliate the insipid and tiresome uniformity of the measure; and as for any thing like expression, we may as well expect to be affected by the mechanical strut of a soldier upon the parade. In other metres, such as those already given in the preceding examples, where feet of different times are intermixed, *some* variety is indeed acquired; but it is a misplaced variety, which, without obviating the tiresome effect of a confinement to no more than *two* lengths of notes, adds to it that of an awkward and uncouth arrangement; the ear is still fatigued with uniformity where it requires change, and distracted by change where it requires uniformity.

Modern music, on the contrary, by its division into *equal* bars, and its *unequal* subdivision of these bars by notes of various lengths, unites to the pleasure which the ear is by nature formed to receive from a regular and even measure, all the variety and expression which the ancients seem to have aimed at by sudden and convulsive changes of time, and a continual conflict of jarring and irreconcilable rhythms.

Nothing seems more essential to musical pleasure, than the division of melody into equal portions of time, or bars. Quintilian attributed to this natural mensuration of the ear, the first production of poetry: "Poema—aurium mensurá, et similiter decurrentium spatiorum observatione esse generatum." Hexameters and Iambics appear to have been the most ancient Greek metres; and the latter, if we may credit Horace, Art. Poet. 253, were at first *pure* and uncompounded. The mixture of *unequal* feet, and the Dithyrambic licence of lyric poetry, were later refinements. The progress of musical rhythm was, of course, the same. Plutarch expressly says, in the dialogue de Musica, that the compositions of Terpander, and other old masters, were set to Hexameters, chiefly of Homer; that is, they were in regular common time. The change and intermixture of rhythms is spoken of as the innovation of modern artists. Plato rejects these complicated measures from the music of his republic; and even Isaac Vossius, the great champion of ancient rhythm, who asserts that "no man can be a good musician, that is not a *good drummer*," owns, p. 11, that "vitiosum et incompositum imprimis, fiet carmen, si duorum, trium, quatuor, pluriumve temporum pedes, veluti Pyrrichii, Iambi, Dactyli, Pæones, Ionici, simul copulerentur;" though this is done continually, not only in the lyric part, but even in the dialogue of the ancient drama.

It is evident, from the proofs already given, that the Greeks and Romans had but two different degrees of long and short notes; and even the old lozenge and square cha-

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acters still used in the *canto fermo* of the Romish church, under the denomination of Gregorian notes, are but of two kinds; the time of these may, indeed, have been accelerated or retarded, but still the same proportion must have been preserved between them; and all their variety must have arisen from different combinations of these two kinds of notes, such as any two of ours could afford; as semi-breves and minims, minims and crotchets, or crotchets and quavers.

This accounts for the facility with which even the common people of Greece could discover the mistakes, if any were committed, in the length and shortness of the syllables, both with respect to the poetry, and the music, a point of history in which all writers agree; for besides the intervals peculiar to the melody, rhythm, or time, must have contributed to characterize the modes, though it has no kind of connection with our flat and sharp keys; and this gives an idea quite different from what our modern modes, taken as keys, and our music, in general, furnish. Tartini, upon this subject, says, that we make the prosody subservient to the music, not the music to the prosody; and adds, "that as by the laws prescribed to the ancient musicians, they were obliged to preserve rigorously in their music the quantity of syllables, it was impossible to protract a vowel, in singing, beyond the time which belonged to a syllable; we, on the contrary, prolong the vowels through many bars, though in reading they are oftentimes short."

Tartini, however, in pure courtesy, allows to the ancients a discretionary power of making syllables longer or shorter than rigorous time would admit, in order to diversify expression, and to enforce the passion implied by the words; but if time was rigorously beaten, in the manner the ancients have related, it is not very easy to subscribe to this opinion.

Having explained the nature, difference, and properties of ancient rhythm, Dr. Burney bestows a few words on an examination of the modern, and endeavours to shew what it has, in common with the ancient, and what peculiar to itself.

We no longer know rhythm now under its ancient name; however, it has been continued, with a small change of pronunciation, merely to express the final cadence of verses, or the agreement and similarity of sound in the last syllables of two or more lines in poetry; being at present what we call *rhyme*; whereas the proportion subsisting between the different parts of a melody are called *time, measure, movement*.

And when we come to examine this proportion, we find that it only consists of two kinds, differently modified; and these two are known by the names of *common time*, consisting of equal numbers, and *triple time*, of unequal.

Tartini has deduced all measure from the proportions of the octave and its fifth. "Common time, or measure," says he, "arises from the octave, which is as 1 : 2; triple time arises from the fifth, which is as 2 : 3. These," adds he, "are the utmost limits within which we can hope to find any practicable proportions for melody. Indeed many have attempted to introduce other kinds of measure, which, instead of good effects, have produced nothing but the greatest confusion; and this must always be the case. Music has been composed of five equal notes in a bar, but no musician has yet been found that is able to execute it."

By the improvement of instrumental music, and indeed by the liberties which we have taken with poetry in singing, we have multiplied notes, and accelerated the measure. Instead of one sound to one syllable, or one portion of time for a short syllable, and two for a long one, we frequently divide and subdivide the time of these several portions into

all their aliquot parts, and sometimes into incommensurable quantities.

After the invention of musical characters for time, different from those in poetry, the study of their relations became one of the most laborious and perplexed parts of a musician's business. These characters were of different value and velocity, according to other characters placed at the beginning of a musical composition, and likewise frequently occurring in the course of a piece, to announce a change of measure; as from common time to triple, from quick to slow, or the contrary. These characters were called *moods*, but they were so extremely embarrassing and ill understood, till the invention of bars, by which musical notes were divided into equal portions, that no two theorists agreed in the definition of them.

These modes, by which the kind of movement, with respect to quick and slow, as well as the proportions of the notes, used to be known, since the use of technical terms, chiefly taken from the Italian language and music, has been adopted, serve no other purpose than to mark the number and kind of notes in each bar.

But by this invention of musical characters for time, and the use of bars, we have certainly advanced in the performance of instrumental music, by giving to it more energy and accentuation; it has now a cadence and feet of its own, more marked and sensible than those of poetry, by which it used to move.

We have also, in our *airs*, a distinct species of music for poetry, wholly different from recitative and chanting; for in these we are no more tied down to stated measure than the ancients, but are governed by the accent and cadence of the words. However, our florid-song, it cannot be dissembled, is not always sufficiently subservient to poetry; for in applying music to words, it frequently happens that the finest sentiments and most polished verses of modern languages are injured and rendered unintelligible, by an inattention to prosody. Even the simple and plain rules of giving a short note to a short syllable, a long to a long; and of accentuating the music by the measure and natural cadence of the verse, which the mere reading would point out to a good ear and understanding, are but too frequently neglected.

Modern melody requires, perhaps, more than a single sound to a single syllable; and a fine voice deserves, now and then, a long note to display its sweetness; but this should be done upon long syllables, and to open vowels, and, perhaps, in general, after the words have been once simply and articulately sung, for the hearer to know what passion is intended to be expressed, or sentiment enforced, by future divisions.

Expletives, particles, and words of small importance, are forced into notice by careless or ignorant composers, who, only intent upon mere music, pay no regard to her sister, poetry. But then, poetry, in revenge, is as little solicitous about musical effects; for symmetry of air, or simplicity of design, are generally so little thought of, that every heterogeneous idea, which can be hitched into rhyme, is indiscriminately crowded into the same song. Indeed music and poetry, like man and wife, or other associates, are best asunder, if they cannot agree; and on many occasions, it were to be wished, that the partnership were amicably dissolved.

Salinas tells us, from St. Augustine, that poets and musicians have ever been at strife concerning long and short syllables, accents, and quantity, since they have ceased to be united in one and the same person, and have set up different interests.

There is some poetry so replete with meaning, so philosophical,

tophical, instructive, and sublime, that it becomes wholly enervated by being drawled out to a tune, which affects no part of the head, but the ear.

And there is, again, some kind even of instrumental music, so divinely composed, and so expressively performed, that it wants no words to explain its meaning; it is itself the language of the heart and of passion, and speaks more to both in a few notes, than any other language composed of clashing consonants, and insipid vowels, can do in as many thousand.

And, upon the whole, it seems as if poetry were more immediately the language of the head, and music that of the heart; or, in other words, as if poetry were the properest vehicle of instruction, and modulated sound that of joy, sorrow, and innocent pleasure. "Let the musician," says M. Rousseau, "have as many images or sentiments to express as you please, with few simple ideas; for the *passions* only *sing*, the *understanding* speaks."

But, notwithstanding both poetry and prosody are so frequently injured by injudicious composers, it must not be imagined that in our simple airs of the gavot and minuet kind, we have no musical rhythm, or that it always clashes with the poetical. Innumerable instances may be given from well-known English songs, where the cadence of the verse, and even the pronunciation of each syllable, is carefully preserved by the air. For though our time-table furnishes six different degrees of long and short notes, without points, yet, if the divisions in songs designed to display a particular talent for difficult execution be excepted, we seldom use more than *two* kinds of notes in the same air.

"Mirth, admit me of thy crew," by Handel, as well as several popular songs by Dr. Arne, Mr. Jackson, and others, are sufficiently conformable to poetical numbers and rhythm, to satisfy the greatest admirers of ancient simplicity, or even such as love poetry better than music, from whom complaints of non-conformity generally proceed.

Isaac Vossius says it is now above a thousand years since musicians have lost that great power over the affections, which arose only from the true science and use of rhythm; and he accuses modern music of such a want of time and accent, as to be all of one style and colour. We will not defend the age in which Vossius wrote from the charge, nor the music of the present serious opera in France; but the compositions of Italy and Germany are certainly free from the censure, as music is now more divided into phrases, and sentences, than it was; time is more marked, and more easily felt than it has ever been since the days of Guido. What it was before, is not very well known; but to confess the truth, it is our opinion, that whatever it has comparatively lost in some particulars, it has gained in others.

RHYTHMICA, RHYTHMICE, ῥυθμικη, in the *Ancient Music*, that branch of music which regulated the rhythmus. See the preceding article.

RHYTHMOPŒIA, one of the musical faculties, as they are called, which prescribes rules for the motions, or rhythm.

The ancient rhythmopœia is very defective. We find nothing of it in the books of the ancients, but some general hints, which can scarcely be called rules. In their explications there appears nothing but what belongs to the words and verses of their songs, which is a strong presumption they had no other. See RHYTHM.

RHYTIDOSIS, formed of ῥυτιδος, *to wrinkle*, the name of a distemper of the eye, in which it waxes and wrinkles up.

RHYTIS, in *Botany*, from ῥυτις, *a channel*, or *furrow*, so named by Loureiro, because it has a furrowed berry.

—Loureir. Cochinch. 660.—Class and order, *Polygamia Dioecia*. Nat. Ord. . . .

Gen. Ch. Perfect Flowers, *Cal.* Perianth inferior, cloven into from three to six, obtuse, spreading segments. *Cor.* none. *Stam.* Filaments three, thread-shaped, erect, longer than the calyx, attached to the receptacle; anthers two-lobed. *Pist.* Germen superior, rather long; style none; stigmas three, cloven, reflexed. *Peric.* Berry flatly ovate, rugose, flaccid, with one cell, and three, ovate, small seeds.

Female Flowers on a separate plant, *Cal.* Perianth inferior, cloven into numerous, lanceolate, hairy, spreading segments. *Cor.* none. *Stam.* none. *Pist.* and *Peric.* as in the perfect flowers.

Ess. Ch. Calyx from three to six-cleft. Corolla none. Stamens three. Stigmas three. Berry three-seeded.

Female, Calyx cloven into many segments.

1. *R. fruticosus*. Shrubby Rhytis. Loureir. Cochinch. 660.—Native of woods in Cochinchina.—A *shrub* about six feet high. *Stem* nearly erect, branched in a spreading manner. *Leaves* alternate, ovate-oblong, slightly pointed, smooth, entire. *Flowers* in long, slender, crowded, terminal spikes. *Berry* channelled.

RHYTIUM, in *Ancient Geography*, a town of the island of Crete.

RHYZELIUS, ANDREW, in *Biography*, a learned Swedish bishop, was born in West Gothland in 1677, and studied at Upsal. In 1711 he was appointed professor of theology at Abo, from thence he proceeded to Upsal, where he was ordained, and appointed under pastor of the congregation of St. Nicholas at Stockholm. In 1713 he was nominated by Charles XII. to be one of his chaplains, whom he afterwards accompanied to Norway. He obtained other high offices, and at length, in 1743, he was raised to the episcopal bench. He died in the year 1761, leaving behind him a high character for deep learning and accurate judgment. His works are numerous, some of which are, 1. "Svio-Gothica munita," or an historical description of the towns, fortresses, castles, and royal palaces in the kingdoms of Sweden and Gothland. 2. "Monasteriologia Svio-Gothica," or a description of monasteries. 3. "Mnemonica Historiæ Svio-Gothica Epitome." 4. "Episcoposcopia Svio-Gothica," or a chronicle of the Swedish bishops. Gen. Biog.

RIACA, or RIAZA, in *Geography*, a river of Spain, which rises in the mountains which separate Old and New Castile, and runs into the Duero near Roa.

RIADHIAT, in *Modern History*, a superstitious practice among the Mahometans, and chiefly among those of Hindoostan, which consists in shutting themselves up for fifteen days, without any other nourishment than bread and water, in a place where there is no light; during which time, the devout Mussulman incessantly repeats the word *hou*, which denotes one of the attributes of God.

RIAITTE', in *Geography*, a town of France, in the department of the Lower Loire, and chief place of a canton, in the district of Ancenis; 12 miles N. of Ancenis. The place contains 613, and the canton 5555 inhabitants, on a territory of 150 kilometres, in 5 communes.

RIAL, in *Commerce*. See REAL.

RIAL, or *Royal*, is also the name of a piece of gold anciently current among us for ten shillings.

In 1 Henry VI. by indenture of the mint, a pound weight of gold of the old standard was coined into 45 rials, passing for ten shillings a-piece, or a proportional number of half rials, passing at five shillings a-piece; or rial farthings, which went at two shillings and two-pence.

In 1 Henry VIII. the gold rial was ordered to pass at eleven shillings and three-pence. In 2 Elizabeth, gold rials were coined at fifteen shillings a-piece, when a pound weight of old standard gold was to be coined into 48 rials. In 3 James I. rose-rials of gold were coined at thirty shillings a-piece, and spur-rials at fifteen shillings.

RIALEJO, in *Geography*, a town on the W. coast of the island of Teneriffe.

RIALEJO, or *Ria Lexa*. See REALEJO.

RIALP, a town of Spain, in the province of Catalonia.

RIANA, in *Botany*, a genus of Aublet's; but that author gives no account, or reason, why it is so called. We presume this may be its common name in Guiana.—Aubl. Guian. 237. Juss. 287. Lamarck Illustr. t. 135.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Berberides*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, cloven into five, roundish, acute segments. Cor. Petals five, ovate, acute, joined at the base. Nectary of five scales. Stam. Filaments five, very short, inserted at the base of the nectary; anthers ovate-oblong, nearly sessile, two-celled. Pist. Germen superior, ovate, villous, with five streaks; style fleshy; stigma capitate, obtuse. Peric. Capsule oblong, of one cell, and three valves, compressed in the middle. Seeds three.

Obf. Aublet describes the five-scaled nectary, as five inner petals.

Ess. Ch. Calyx deeply five-cleft. Petals five. Nectary composed of five scales. Anthers nearly sessile. Capsule of one cell and three valves. Seeds three.

1. *R. guianensis*. Aubl. Guian. t. 94.—Native of woods in Aroura, where it flowers in August. This shrub is ten feet high, and has a branched trunk. Branches erect, knobbed. Leaves opposite, stalked, ovate-oblong, acute, toothed, smooth, rigid. Stipulas short, twin, opposite, acute, deciduous. Flowers white, arranged in an alternate manner, forming a terminal spike; each flower on a short stalk, which has four scales or bracteas at the base.

Jussieu suspects that this plant may be akin to *Passoura*, Aubl. Guian. t. 380.

RIANANTLA, in *Geography*, a town of Mexico, in the province of Tlascala; 60 miles S. of Puebla de los Angeles.

RIANJO, a town of Spain, in Galicia, at the mouth of the Ulla; 23 miles S.W. of Compostella.

RIANO, a town of Italy, in the Patrimonio; 13 miles N. of Rome.—Also, a town of Naples, in Abruzzo Ultra; 8 miles W. of Teramo.

RIANS, a town of France, in the department of the Var; 10 miles N.W. of St. Maximin.

RIAO, an island in the East Indian sea, about 25 miles in circumference, near the W. coast of Morty. N. lat. $2^{\circ} 25'$. E. long. $128^{\circ} 2'$.

RIAPA CREEK, a river of West Florida, which runs into the Mississippi, N. lat. $31^{\circ} 2'$. W. long. $91^{\circ} 17'$.

RIAVIA, a mountain of Africa; 60 miles W. of Tripoli.

RIAZAN, a town of Russia, and capital of a government, on the Oka; 80 miles S.S.E. of Moscow. N. lat. $34^{\circ} 45'$. E. long. $38^{\circ} 54'$.

RIAZANSKOE, a government of Russia, bounded on the N. by Vladimirkoi, on the E. and S. by Tambovskoi, and on the W. by Molkovkaia and Talkoe; 108 miles from N. to S. and 100 from E. to W. N. lat. $54^{\circ} 40'$ to $55^{\circ} 20'$. E. long. 38° to 41° .

RIAZSK, a town of Russia, in the government of

Riazan; 56 miles S.E. of Riazan. N. lat. 54° . E. long. $40^{\circ} 4'$.

RIB, in *Rural Economy*, the small arched bones forming the chests of animals. Cattle and most other animals should be full in the rib.

In horses the chest or barrel formed by the ribs should be full and circular, taking their fullness quite from the back-bone. See HORSE.

RIB-Furrowing, in *Agriculture*, a mode of ploughing somewhat similar to that of ribbling.

RIB-Grass, a sort of grass much cultivated in some districts, and which is said to afford an herbage of which cattle are very fond. It is also asserted to be useful as a grass for milch cows, and also for fattening any sort of stock. It is an indigenous plant in this country, which frequently abounds in pasture or meadow lands where the soil is rather inclined to moisture. See PLANTAGO.

In the mode of cultivating it as a grass for cattle food under the modern system of husbandry, from four to six pounds of seed are sown by Mr. Donaldson to be sown upon the acre. It is a coarse sort of grass, however, that requires to be kept well fed down, in order to render it valuable and prevent its running to seed.

In Cheshire some farmers are fond of it, while others think that its place would be better supplied by some of the other grasses. In some places, some fields are sown with it, nearly without any admixture of grass feeds; and where plentiful crops of it have been produced no animal would eat it, which is supposed probable from its nature. And in the Staffordshire agricultural report, it is said that there is authority for asserting that cattle will not eat its leaves, but it is believed to be grateful in admixture with other herbage.

RIBA, or RIBAS, in *Geography*, a town of Spain, in New Castile, on the Xaramo, founded by William de Ribas of Segovia, a celebrated commander, in the year 1100; 9 miles from Madrid.

RIBA de Sella, a small sea-port of Spain, in Asturia, on the coast of the Atlantic; 36 miles E.N.E. of Oviedo. N. lat. $43^{\circ} 28'$. W. long. $5^{\circ} 18'$.

RIBADAVIA, a town of Spain, in Galicia, famous for its vineyards, which are said to produce some of the best wine in Spain; 15 miles S.W. of Orense.

RIBADENEIRA, PETER, in *Biography*, a Spanish Jesuit, was a native of Toledo. He studied at Paris and at Padua, after which he taught rhetoric with reputation at Palermo. He died at Madrid in 1611, aged 81. His works are "Lives of the Saints," folio, 1616; the "Lives of St. Ignatius Loyola, St. Francis de Borgia, and of the Father Lainez and Solmeron;" "A Treatise of the Schism of England;" another entitled "The Prince," which is full of bad political maxims; and the "Library of Writers among the Jesuits," 8vo.

RIBADEO, in *Geography*, a sea-port town of Spain, in Galicia, at the mouth of the Eo, with a good harbour defended by two castles; 15 miles N.E. of Mondonedo. N. lat. $43^{\circ} 33'$. W. long. $7^{\circ} 5'$.

RIBAGNAC, a town of France, in the department of the Dordogne; 5 miles S. of Bergerac.

RIBAGORZA, a district of Spain, bordering on the E. part of Aragon, and W. part of Catalonia; watered by the river Noguera de Ribagorza, about 40 miles long and 18 wide, N. of Balaguers.

RIBAN, an island in the Red sea, near the coast of Arabia. N. lat. $17^{\circ} 12'$.

RIBAT-

RIBATTUTA, Ital. in *Music*, is iterating, striking, or founding the same note again.

RIBATTUTA *di Gola* is one of the graces used in sing-

ing; it is performed by beating or striking two diatonic notes, the one slow and the other quick, in the following manner.



It differs from the shake and the beat.

RIBAUEQUEM, in *Ancient Artillery*, a projectile machine used in the 11th and 12th centuries, which was a large kind of cross-bow: the cross-bow was called in Latin *ballista*, and sometimes *manubalista*.

RIBAUVILLE', in *Geography*, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the district of Colmar; 6 miles N. of Colmar. The place contains 4950, and the canton 14,219 inhabitants, on a territory of 85 kilometres, in 9 communes.

RIBBAND, or RIBBOND, a narrow sort of silk, chiefly used for head ornaments, badges of chivalry, &c.

The knights of the Garter wear a blue ribband; those of the Thistle, a green ribband, &c. scarfwise. See COLLAR, GARTER, &c.

RIBBANDS, *Figured*. See FIGURED.

RIBBAND, or *Ribbon*, in *Heraldry*, is the eighth part of a bend. (See the article BEND.) It is borne a little cut off from the outlines of the escutcheon: thus; he beareth or, a ribband, gules.

RIBBANDS, from *rib* and *band*, in *Ship Building*, are long pieces of fir timber from four to eight inches square, according to the size of the ship; these are nailed on at certain heights to the frame timbers of the square body, as the *harpins*, which are oak of the same size, are nailed to the frames of the cant-bodies; but the latter are shaped to the form of the body by moulds and bevelling. The ends of the harpins forward are fastened against the stem, and those abaft against the stern-post or transoms; the ribbands then uniting with the harpins, envelop the ship lengthways, and being judiciously arranged, with regard to their distance from each other, they not only support the filling-timbers, but by being shored at every frame, the whole ship is supported, and kept to her true shape, until the plank is brought on, as they are in that case removed one at the time, the bottom being shored against the planks above. The difference between cant-ribbands and horizontal or square ribbands is, that the latter are only ideal, and used in the laying-off.

RIBBING NAILS. See NAIL.

RIBBLE, in *Geography*, a river of Lancashire, England, has its source in the high moors of Craven, Yorkshire, and passing the lofty mountains of Ingleborough and Pennigant, enters the county of Lancashire near the town of Clitheroe, where it forms a boundary to the county. Taking a south-western course, and receiving, in its progress through Lancashire, several smaller streams, and the tributary rivers of the Hodder, Calder, and Darwent, it passes by Ribchester and Preston. Soon after leaving the latter town it gradually expands its stream, and in a few miles presents a broad estuary, and unites its waters with the Irish sea. At this place, the ferry from North Theals to Lytham, it is about five miles across at high water. This river is navigable, for small coasters, as high as Preston, and was formerly capable of conveying vessels much higher up the country. At Preston it is crossed by an aqueduct, for the Lancaster canal. See Aston's Lancashire Gazetteer, Beauties of England, vol. ix. and Whitaker's History, &c. of Whalley, 4to.

RIBBLING, in *Agriculture*, a term used in some districts to signify a mode of ploughing similar to that of slob-fur-

rowing. It is practised in some northern counties as well as those of the south, and in the former appears to be the only kind of winter fallow which is beneficial to lands of loose texture. Every furrow that is turned over on a foot of solid ground, from the beginning to the end of the ridge, that is every alternate furrow, is left untouched, and the ploughed furrow is turned over above it, so that the greatest surface possible is exposed to the ameliorating influence of the atmosphere, while, at the same time, the loose soil is out of the reach of any little rills which may run down in the different ruts. If the stubble has been, in some measure, luxuriant, and the ribbling done soon after the crop was taken from the ground, the two strata of stubbles meeting and fermenting under cover of the rid furrow, form, it is supposed, an aid to the subsequent manure, while the weeds are no less smothered than when the whole land is turned over by a complete ploughing. Nevertheless, it is believed, that when the use of green crops becomes general, and the planting and noeing of them are neatly performed by the plough, this will stir the earth more perfectly, and pulverize and clean the soil more completely than any winter fallow or ribbling can possibly effect. See TILLAGE.

RIBCHESTER, in *Geography*, a village and parish in the hundred of Blackburn, and county palatine of Lancashire, England, is situated at the distance of five miles and a half N.N.W. from the town of Blackburn, and eight miles N.E. from Preston. Though now comparatively an insignificant place, it was in Roman times an important and flourishing town. Much dispute has taken place among antiquaries with respect to the original name of this station. Horsley calls it the *Coccium* of Antoninus, and Camden the *Rigodunnum* of Ptolemy, the identity of which places is clearly proved by the reasonings of Dr. Whitaker, in his History of Whalley. (See *Coccium*, in which article for *Ribchester* read *Ribchester*.) Mr. Whitaker, the author of the History of Manchester, however, contends that Ribchester must have been the *Rerigonium* of Richard of Cirencester, and places *Coccium* at Blackrod. But whatever was the name of this place, it was indubitably among the number of *Agricola's* stations, and appears to have been not merely a military post, but the seat of manufacturing and commercial prosperity. At that period the river Ribble was navigable as high as *Coccium* to vessels of no inconsiderable burden. Of this fact, tradition, the vestiges of a dock, and numerous nautical relics, afford incontestible proof. To the filling up of the river, by the gradual accumulation of sand, is to be attributed, in part at least, the decay of this place after its abandonment by the Romans. Many votive stones, and others with inscriptions, have been found here. Of these Dr. Whitaker has printed nine, but they do not furnish any thing interesting either with respect to the place or the people. Various smaller antiquities have likewise been dug up here at different periods; such as silver and brass coins, an intaglio in a ruby, gold rings, &c. "But," to use the words of the historian of Whalley, "the noblest discovery ever made here, or perhaps in Britain, was in the year 1796, when the shelving bank of the Ribble exposed the following remains, which seemed to have been deposited in an excavation of the earth, filled up with soil of a different quality. These were,

were, 1. A large flat earthen vessel, extremely thick, with the potter's stamp very distinct, "Boriedof, *Boriedi officina*." 2. An entire patera of copper, about six inches diameter, with a handle. 3. The imperfect remains of a similar vessel. 4. A column, or colander of the same size and metal. 5. Several concave and circular plates of copper, with loops behind, which had evidently been intended to fasten them perpendicularly against a shaft, in order to form a Roman vexillum: such are frequent upon ancient monuments; but for a particular illustration, the reader is referred to a monument of Lucius Duccius, signifer of the ninth legion, in Horsley, pl. 63. 6. A very fine helmet, of which the crest was a sphinx, afterwards unfortunately lost, the head-piece enriched with basso relievos of armed men skirmishing with swords, and a visor, consisting of an entire and beautiful female face, with orifices at the eyes, mouth, and nostrils." These remains were deposited in the museum of Charles Townley, esq. The helmet particularly merits attention. From the style of the head-piece, it is conjectured by the best judges not to be prior to the age of Severus; but the visor is a much more delicate and exquisite piece of workmanship, and is supposed not only to be Grecian, but, from the boldness of its lines, to belong to a period somewhat anterior to the last perfection of the arts in that wonderful country. For engraving of this helmet, with some observations thereon, see "Vetusta Monumenta," vol. iv.

The chief remains of this station, now visible, are a mutilated rampart and fosse, surrounding a small eminence near the church, which is called Anchor-hill, from the circumstance of several anchors having been dug up at its base. In the same place, some years ago, an entire vessel was discovered at a great depth beneath the surface of the ground. From this place the Roman road, called Watling-street, stretches itself in a northern direction over Long Ridge Fell, marked by "a long stripe of green intersecting the brown heath of the mountain." Hence it is denominated Green Lane. It enters Yorkshire a little below Dowford bridge, and proceeds by Newton and Bentham to the celebrated station at Overborough.

The parish of Ribchester formerly constituted a portion of the original parish of Whalley, but was severed from it at the same time with that of Chipping. According to the parliamentary returns of 1811, it contained 649 houses, and 3544 inhabitants, including the townships of Ribchester, Dilworth, Dutton, Alton, and Hotherfal.

At Stede, in the vicinity of Ribchester, is a parochial chapel, which Dr. Whitaker states to be the oldest building within the boundaries of ancient Whalley. It appears to have formerly belonged to a guild, or hospital, and, from the style of its architecture, was probably erected in the reign of king Stephen. The arches are slightly pointed, and are decorated with zigzag, and other Saxon ornaments. In the interior is a "coffin tomb" of high antiquity, placed in front of the pulpit, which is elevated upon an antique stone pediment. The floor is covered with ancient grave stones, some of which are inscribed with Longobardic or Norman characters. An History of the original Parish of Whalley and Honor of Clitheroe, in the Counties of Lancaster and York, by Thomas Dunham Whitaker, L. L. D., F. S. A. 2d edit. 4to. Lond. 1806. A Description of the Country, from thirty to forty Miles round Manchester, by J. Aikin, M. D. 4to. Lond. 1795. History of Manchester, by John Whitaker, B. D., F. S. A. 2 vols. 4to. 1771. Antiquitates Bremetonacenses; or the Roman Antiquities of Overborough, &c. Lond. 4to. 1746.

RIBECOURT, a town of France, in the department of the Oise, and chief place of a canton, in the district of

Compiègne. The place contains 520, and the canton 8805 inhabitants, on a territory of 182½ kilometres, in 21 communes.

RIBEMONT, a town of France, in the department of the Aisne, on the Oise, and chief place of a canton, in the district of St. Quentin; six miles S.E. of St. Quentin. The place contains 2345, and the canton 12,497 inhabitants, on a territory of 182½ kilometres, in 17 communes.

RIBENSKOI, a town of Russia, on the Tunguska; 72 miles E.S.E. of Eniseisk.

RIBERA, FRANCIS DE, in *Biography*, a learned Spanish Jesuit in the sixteenth century, was born in the year 1537. He pursued his academical studies at the university of Salamanca, and acquired a high reputation for his intimate acquaintance, not only with the Latin, but with the learned languages also. Having been ordained priest, he retired to his native place, that he might prosecute his theological studies in uninterrupted privacy, at the same time he was able to assist his brethren in the neighbouring country churches. In the year 1570, when he was thirty-three years of age, he was persuaded to unite himself with the disciples of Loyola, and become a member of their society. He now spent most of his time in interpreting the scriptures, and filling the chair of professor of divinity, in their seminary at Salamanca, till his death, which happened in the year 1591. He was author of numerous works, which are still in estimation with the Catholics; among these may be mentioned "Commentarii in XII. Prophetas minores, sensum eorundem Prophetarum historicum et moralem, sæpe etiam Allegoricum complectentes," 4to. "Commentarii Historici selecti in XII. Prophetas minores," 8vo. "De Templo, et iis quæ ad Templum pertinent Lib. V." 8vo. And "The Life of St. Theresa, Foundress of the reformed Order of the barefooted Carmelites," written in the Spanish language.

RIBERA, GIUSEPPE. See SPAGNOLETTO.

RIBERA, in *Geography*. See St. JAGO.

RIBERA de Muria, a town of Portugal, in Estramadura; six miles N. of Thomar.

RIBERAC, a town of France, and chief place of a district, in the department of the Dordogne; 17 miles E. of Perigueux. The place contains 2985, and the canton 11,194 inhabitants, on a territory of 85 kilometres, in 13 communes. N. lat. 45° 14'. E. long. 6° 25'.

RIBERAIRY, a town of Abyssinia; 25 miles E.N.E. of Axum.

RIBES, in *Botany*, an Arabian name, properly belonging to an acid-leaved species of RHEUM, see that article; but which botanists, for about 200 years past, have, by mistake, applied to the currant and gooseberry family, and with these it now remains. They constitute a natural and very important genus.—Linn. Gen. 111. Schreb. 154. Willd. Sp. Pl. v. 1. 1153. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 263. Prodr. Fl. Græc. Sibth. v. 1. 160. Ait. Hort. Kew. v. 2. 40. Pursh 163. Juss. 310. Lamarck Illustr. t. 146. (Grossularia; Tourn. t. 409. Gærtn. t. 28.)—Class and order, *Pentandria Monogynia*. Nat. Ord. *Pomaceæ*, Linn. *Cassi*, Juss.

Gen. Ch. *Cal.* Perianth superior, of one leaf, tubular, or bell-shaped; the limb cut, about half way down, into five oblong, concave, coloured, reflexed, permanent segments. *Cor.* Petals five, small, obtuse, erect, inserted into the rim of the calyx. *Stam.* Filaments five, awl-shaped, erect, inserted into the rim of the calyx; anthers incumbent, compressed, bursting at the edges. *Pist.* Germen roundish, inferior; style cloven; stigmas obtuse. *Peric.* Berry globose, umbilicated, of one cell, with two lateral, opposite, longitudinal

RIBES.

rudinal receptacles. *Seeds* numerous, roundish, slightly compressed.

Eff. Ch. Calyx superior, tubular, five-cleft. Petals inserted, with the stamens, into the calyx. Style cloven. Berry with many seeds.

The whole genus is shrubby. *Leaves* deciduous, alternate, stalked, simple, lobed and notched. *Flowers* stalked, generally pale, greenish or yellow, rarely reddish. *Fruit* eatable.

Section 1. Currants. *Stem without prickles.*

1. *R. rubrum*. Common Currant. Linn. Sp. Pl. 290. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1289. Woodv. Med. Bot. t. 74. Fl. Dan. t. 967. (*R. vulgaris*, fructu rubro; Ger. Em. 1593.)—Clusters smooth, pendulous. Flowers flattish. Petals inversely heart-shaped. Leaves obtusely five-lobed. Stem erect.—Native of woods and thickets, especially about the banks of rivers, in the north of Europe. Undoubtedly wild on the banks of the Tees, Durham. *Mr. Robson*. Commonly cultivated throughout the cooler parts of Europe, for the sake of its gratefully acid and wholesome berries, of which the white or bluish variety is the sweetest and mildest. It flowers in May; the fruit is scarcely ripe before August. The stem is bushy, three or four feet high, or more, if trained to a wall, with smooth blackish bark. *Leaves* on long stalks, spreading, doubly serrated, veiny, bright green, somewhat downy. *Flowers* in stalked, simple, pale green, drooping clusters. *Petals* yellowish-green. *Braçteas* ovate, minute, solitary at the base of each partial flower-stalk. *Fruit* quite pendulous.

2. *R. petraeum*. Rock Currant. Wulf. in Jacq. Misc. v. 2. 36. Jacq. Ic. Rar. t. 49. Willd. n. 2. Fl. Brit. n. 4. Engl. Bot. t. 705. (*R. n. 818*; Hall. Hist. v. 1. 364. *R. vulgaris rubro flore*; Clus. Hist. v. 1. 119.)—Clusters erect, somewhat hairy; pendulous when in fruit. Flowers flattish. Petals obtuse. Leaves acutely lobed. Braçteas shorter than the flower-stalks. Stem erect.—Native of Germany, Switzerland, and the north of England. This was confounded, even by Haller, with the former. The leaves are more downy, especially about the veins; more acutely lobed and notched. Clusters erect when in blossom; their stalks less elongated in the lower part. *Flowers* often stained with red. *Berries* bright red, very acid.

3. *R. spicatum*. Acid Mountain Currant. Robson Tr. of Linn. Soc. v. 3. 240. t. 21. Fl. Brit. n. 3. Ait. n. 6. Engl. Bot. t. 1290.—Spikes erect. Flowers nearly sessile. Petals oblong. Braçteas shorter than the calyx. Stem erect.—Native of the mountainous parts of Yorkshire and Durham, flowering in May. Differs from the last in having the *inflorescence* spiked, not racemose; upright both in flower and fruit. The berries are red and acid.

4. *R. procumbens*. Trailing Currant. Pall. Ross. v. 1. p. 2. 35. t. 65. Willd. n. 3. Ait. n. 3.—Clusters erect. Flowers flattish. Leaves bluntly lobed. Berries smooth. Stem procumbent. Plentiful, according to Pallas, on the mossy sides of hills in Dauria, where its fruit is much in request. The prostrate stems are concealed among the moss. *Leaves* not bigger than those of a gooseberry-bush, while the shrub is in blossom, but afterwards attaining the size and shape of the three foregoing species. *Flowers* like *R. rubrum*, but smaller, in erect clusters, which become drooping as the fruit ripens. The berries are full as large as a common Black Currant, but of a greenish-yellow, or, when quite ripe, reddish.

5. *R. glandulosum*. Glandulous Currant. Ait. n. 4. Willd. n. 4. (*R. prostratum*; L'Herit. Stirp. v. 1. 3. t. 2. Vol. XXX.

Pursh n. 4.)—Clusters erect, rough with glandular hairs. Flowers flattish. Leaves acutely lobed, toothed. Braçteas minute. Berries hispid. Stem creeping, with ascending branches.—Native of rocky moist places, in Newfoundland, Canada, and Pennsylvania, flowering in April and May. *Pursh*. Habit and leaves not unlike the last. The flowers are yellow, tinged with red. *Berries* red.

6. *R. rigens*. Stiff-branched Currant. Michaux Boreal-Amer. v. 1. 110. Pursh n. 3.—Clusters lax, erect. Leaves acutely lobed and toothed, reticulated, rugose; downy beneath. Berries roughish. Branches straight.—On the banks of lake Mistassins, in Canada. *Michaux*. In the Pennsylvania mountains, &c. flowering in May and June. *Berries* red, erect, as well as the flowers. *Pursh*.

7. *R. trifidum*. Notched-flowered Currant. Michaux Boreal-Amer. v. 1. 110. Pursh n. 2.—Clusters lax, downy. Leaves lobed, smooth; downy beneath. Flowers flattish. Segments of the calyx slightly three-cleft. Petals spatulate. Berries hairy.—Found by Michaux near Quebec, and at Hudson's Bay; by Pursh on the Pennsylvania mountains, &c. flowering in April and May. *Flowers* like *R. rubrum*, but smaller. *Calyx* pale green. *Petals* purple, rounded, and blunt at the end. *Berries* red.

8. *R. albinerve*. White-veined Currant. Michaux Boreal-Amer. v. 1. 110. Pursh n. 1.—Clusters recurved. Berries smooth. Leaves short, acutely lobed, smoothish, with pale ribs.—Found by Michaux, about lake Mistassins, Canada; by Pursh, on the Catskill mountains, about New York, &c. flowering in April and May. *Flowers* small, greenish-yellow. *Berries* red.

9. *R. alpinum*. Tasteless Mountain Currant. Linn. Sp. Pl. 291. Willd. n. 5. Fl. Brit. n. 2. Engl. Bot. t. 704. Jacq. Austr. t. 47. Fl. Dan. t. 968.—Clusters erect. Braçteas longer than the flowers. Leaves smooth; shining at the back. Stem erect. Berries smooth.—Native of mountainous woods and thickets, in Germany, Switzerland, Sweden, Siberia, and the north of England, flowering in April and May. The leaves are rounder, and scarcely half so large as those of our common Currants, besides being quite smooth on both sides, and remarkably polished beneath. Braçteas very long, acute, erect. *Flowers* said to be often dioecious, from which cause perhaps the fruit is seldom perfected in our shrubberies, where this species often occurs. The berries are somewhat elliptical, of a beautiful red, but hispid and mucilaginous like a solution of gum arabic.

10. *R. resinosum*. Resinous Currant. Pursh n. 5. Curt. Mag. t. 1583.—Whole plant viscid, with glandular hairs. Leaves with roundish, notched lobes. Clusters erect. Flowers flattish. Braçteas tongue-shaped, concave, as long as the flowers. Berries hairy.—Gathered on the mountains of North America, by Mr. Frazer, from whose garden we obtained flowering specimens, in May 1810. This has more the aspect of a gooseberry-bush, especially in the size and form of the leaves, but the whole herbage is clothed with downy, viscid, foetid pubescence. Clusters most like those of *R. alpinum*, but the partial flower-stalks are extremely short, and the braçteas more obtuse, and elliptical. *Flowers* apparently dioecious, green, with short, rounded, yellowish petals.

11. *R. viscosissimum*. Glutinous Currant. Pursh n. 6.—Whole plant very glutinous, with viscid hairs. Leaves heart-shaped, bluntly three-lobed, serrated. Clusters short, erect. Calyx tubular. Petals oblong. Braçteas linear-spatulate, shorter than the partial flower-stalks. German hairy.—Found by the late governor Lewis, on rocky mountains in the interior of North America, flowering in

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June. Whole plant covered with viscous hair. *Flowers* large, yellow. This approaches near to *R. glandulosum*, Fl. Peruv. v. 3. 13. t. 233. f. b. It differs principally in the *leaves* being equally lobed, not having the middle lobe projecting; its long slender *partial flower-stalks*, and its *petals*. *Pursh*.

12. *R. sanguineum*. Crimson-flowered Currant. *Pursh* n. 7.—Leaves heart-shaped, three-lobed, ferrated, veiny; smooth above; finely downy and hoary beneath. Clusters lax, downy, twice the length of the leaves. Calyx tubular. Petals oblong, equal to the limb. Bractæas obovate-spatulate, the length of the partial stalks. Germen hairy.—Gathered by governor Lewis, on the Columbia river, flowering in March. *Branches* purple. *Flowers* beautiful, blood-red or purple. It nearly approaches *R. albinervium*, Fl. Peruv. v. 3. 12. t. 232. f. b. *Pursh*.

13. *R. malvaceum*. Mallow-leaved Currant.—Leaves heart-shaped, slightly five-lobed, ferrated, veiny; hispid on both sides; densely downy beneath. Clusters hairy, longer than the leaves. Calyx tubular, hairy. Petals rounded, not half so long as the limb. Bractæas ovate, acute, jagged, half the length of the calyx.—Gathered in California, by Mr. Menzies. *Branches* dark purple, downy, like every part of the plant. *Leaves* an inch, or inch and half, long; dark green above; white, and densely downy, beneath; hispid on both sides with glandular bristles. *Stipulas* beautifully fringed. *Clusters* dense, on long, rough, glandular stalks. *Calyx* red, about half an inch long, hairy, especially its base, and the *germen*. *Petals* wedge-shaped, rounded, somewhat cloven, scarcely one-third so long as the segments of the limb, which are elliptical. *Stamens* the length of the petals. *Bractæas* elegantly jagged and fringed. This fine species seems nearly allied to the last. We have not at hand the *Flora Peruviana*, to ascertain how far it resembles any in that work.

14. *R. aureum*. Golden-flowered Currant. *Pursh* n. 8.—Very smooth. Leaves with three, obtuse, sparingly notched lobes. Footstalks fringed at the base. Clusters dense. Calyx tubular, slender. Petals linear, half the length of the limb. Bractæas linear, equal to the partial stalks. Berry smooth.—Found by governor Lewis on the banks of the Missouri and Columbia, flowering in April. We received wild specimens from Mr. John Bradbury, three years ago. The *leaves* have the aspect of Hawthorn. *Flowers* in dense clusters. *Calyx* of a beautiful golden yellow, about three-fourths of an inch long, not unlike the flower of a Jonquill in miniature, and reported to have a similar scent; its segments oblong, obtuse. *Petals* purple. *Berries* red or brown, considerably larger than any garden currants; and peculiarly delicious in flavour. This very desirable plant is introduced into the gardens about London, but we have not yet heard of its blossoming.

15. *R. recurvatum*. Recurve-branched Currant. Michaux Boreal-Amer. v. 1. 109. *Pursh* n. 9.—“Branches recurved. Leaves dilated, downy, dotted with minute glands, acutely-lobed. Clusters reflexed. Calyx tubular, smooth.”—Found near Hudson’s Bay. *Michaux*. *Berries* black. We know nothing more of this species.

16. *R. fragrans*. Fragrant Siberian Currant. “Pallas Nov. Act. Acad. Petrop. v. 10. 377. t. 9.” Willd. n. 6.—Stem ascending. Leaves bluntly three-lobed, glandular beneath.—Flowers bell-shaped. Clusters erect.—Native of Siberia, on mountains bordering on the country of the Mongols, where no woods grow. The *stems* are partly procumbent, a foot and a half long; their young *branches* besprinkled with yellow, prominent, glandular dots. *Leaves* on long stalks, smooth, ferrated, slightly five-angled, with

three or five lobes; very veiny, and moist glaucous beneath, where also they are covered with minute crowded drops of a yellow fragrant exudation, having a scent stronger than balm, approaching that of *R. nigrum*, n. 18, to which species indeed the present bears altogether a considerable resemblance. *Clusters* when in flower short, erect, rigid, dense, of about ten white, highly fragrant, *flowers*. *Calyx* bell-shaped, deeply five-cleft. *Petals* lanceolate, acute, spreading. *Bractæas* deciduous, smaller than in *R. procumbens*, n. 4. *Clusters* elongated in fruit, still erect, except when bent down by its weight. *Berries* reddish, extremely sweet, the full size of *R. rubrum*. *Pallas*.

17. *R. trifide*. Dark-coloured Siberian Currant. “Pallas Nov. Act. Acad. Petrop. v. 10. 378.” Willd. n. 7.—Root creeping. Stems erect, leafy in the upper part. Leaves five-lobed. Clusters smooth, pendulous. Flowers flattish. Petals revolute.—Native of lofty mountains in Siberia, towards Tartary. The creeping root throws up many erect *stems*, two or three feet high, bearing at their summits a few scattered *leaves*, resembling those of *R. rubrum*. *Clusters* always pendulous. *Flowers* reddish without, yellowish within. *Berries* small, black, insipid; their deep-red juice very useful for colouring wines. *Pallas*.

18. *R. nigrum*. Common Black Currant. Linn. Sp. Pl. 291. Willd. n. 8. Fl. Brit. n. 5. Engl. Bot. t. 1291. Woodv. Med. Bot. t. 75. Fl. Dan. t. 556. Lob. Ic. v. 2. 202.—Stem erect. Leaves five-lobed, acute. Clusters pendulous, downy, with a separate flower-stalk at their base. Calyx tubular-bell-shaped. *Berries* smooth.—Native of wet bushy islands, and banks of rivers, in Sweden, Germany, Switzerland, and England, flowering in May. In gardens it is well known, and valued for the fruit, whose flavour indeed, in a recent state, is not acceptable to every body; but its jelly is both agreeable, and useful for colds, fore-throats, &c.; whence this currant has been named Squinancy-berry or Quinsy-berry. The bush is of a more humble stature than *R. rubrum*; the *leaves* have a strong scent, if bruised, resembling Savine, and are somewhat glutinous when young. The tube of the *calyx* is more elongated than in any other British species. *Berries* large, black, each bunch always accompanied at the base by a solitary stalk, whose fruit is larger and earlier than the rest. Dr. Withering made the truly curious observation, that the *petals* are sometimes changed into *stamens*, of which we know no other instance.

19. *R. floridum*. Pennsylvanian Black Currant. L’Herit. Stirp. v. 1. 4. Willd. n. 9. Ait. n. 8. *Pursh* n. 10. (*Ribesium nigrum pensylvanicum, floribus oblongis*; Dill. Elth. 324. t. 244. f. 315.)—Leaves three-lobed, cut; dotted with glands on both sides. Clusters pendulous, downy. Calyx somewhat cylindrical. Bractæas about as long as the germen.—Found in hedges and woods, from Canada to Virginia; flowering in April and May. *Flowers* pale yellow. *Berries* black. *Pursh*. The resinous dots on both sides of the *leaves* distinguish this species, and its *flowers* are more oblong than those of *nigrum*, with much larger bractæas.

Sect. 2. Gooseberries. *Stem* prickly.

20. *R. Diacantha*. Two-thorned Cluster Gooseberry. Pallas Reise v. 3. 722. t. I. f. 2. Rossi. v. 1. p. 2. 36. t. 66. Linn. Suppl. 157. Willd. n. 10. Ait. n. 9.—Prickles in pairs, in the place of stipulas. Leaves wedge-shaped, deeply three-cleft, bluntly notched. Clusters nearly erect. *Berries* smooth.—Native of gravelly, stony, saline soils in Dauria. Introduced into England by Mr. Busch, in 1781. Hardy, flowering in May and June. *Ait.* Linnæus says it flowered every year at Upsal, without bearing fruit.

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fruit. Possibly the *flowers* may be in some measure diocious, like those of *R. alpinum*, a species which this nearly resembles, except the prickles.

21. *R. saxatile*. Rock Siberian Gooseberry. "Pallas Nov. Act. Acad. Petrop. v. 10. 376." Willd. n. 11.—Prickles scattered, setaceous. Leaves wedge-shaped, bluntly three-lobed. Clusters erect.—Native of granite mountains in Siberia. Allied to *R. alpinum* and *R. Diacantha*. Berries red, fourish, scarcely so big as our red currant. Pallas.

22. *R. reclinatum*. Procumbent Gooseberry. Linn. Sp. Pl. 291. Willd. n. 12. Ait. n. 10.—Prickles solitary or three together. Branches reclining. Stalks single-flowered, with a three-leaved bractea. Germen hairy.—Native of Germany and Switzerland. Said to have been long known in our gardens. It much resembles the following.

23. *R. Grossularia*. Rough Gooseberry. Linn. Sp. Pl. 291. Willd. n. 13. Ait. n. 11. Fl. Brit. n. 6. Engl. Bot. t. 1292. (*R. Uva crispa*; Fl. Dan. t. 546).—Prickles solitary or three together. Branches spreading. Footstalks hairy. Stalks single-flowered, with a two-leaved bractea. Fruit hairy.—Common throughout Europe, but so generally cultivated, that we can hardly say when we meet with it truly wild. The *shrub* is bushy, of humble growth, armed, as every body knows, with smooth awl-shaped prickles, either solitary or ternate, in the place of *stipulas*. Leaves bluntly three-lobed and cut, slightly downy. Flowers drooping, solitary, green, on downy stalks, with two separate bracteas. Calyx cup-shaped. Germen and fruit rough with prominent bristly hairs. The berries are either green, yellow, or red.

24. *R. Uva crispa*. Smooth Gooseberry. Linn. Sp. Pl. 292. Willd. n. 14. Ait. n. 12. Fl. Brit. n. 7. Engl. Bot. t. 2057. Schmidel Ic. 5. t. 1. (*Uva crispa*; Fuchf. Hist. 187. Ger. Em. 1324).—Prickles usually three together. Branches spreading. Footstalks hairy. Stalks single-flowered. Bracteas united into a tube. Fruit smooth.—Native of Europe, and as commonly cultivated as the last, of which we believe it a mere variety. The number and connection of the bracteas are certainly variable.

25. *R. aciculare*. Needle Siberian Gooseberry.—Prickles scattered, setaceous; those under the buds five together, combined. Leaves bluntly five-lobed and cut. Stalks single-flowered. Bracteas united. Fruit smooth.—Gathered by Laxmann in Siberia. We find two specimens in the Linnaean herbarium of this, which seems a very distinct species, hitherto neglected by every author. The habit is like the three last, but the branches are copiously armed all over with fine, straight, prominent, needle-like, brown prickles, besides the larger ones, five together, and combined by a broad base, which stand, like those of common Gooseberries, under the buds. Flowers solitary, drooping, on longish simple stalks, with two or three bracteas, usually combined, about the middle. Calyx bell-shaped, smooth, red. Petals white, obovate, one-third the length of the limb. Germen smooth.

26. *R. ferax*. Strong-thorned Californian Gooseberry.—Prickles scattered, setaceous, very slender; those under the buds three together, combined, awl-shaped. Leaves five-lobed, rugose, downy beneath. Stalks single-flowered. Segments of the calyx lanceolate, twice the length of its tube. Germen and fruit prickly.—Gathered by Mr. Menzies, near Port Trinidad, in California. A very fine remarkable species, whose branches are thickly covered with tawny, setaceous, prominent prickles, about a quarter of an inch in length, and armed under each bud, with three

very strong and pungent awl-shaped ones, an inch long, having sometimes lesser reflexed prickles at their base. The leaves are not unlike our common Gooseberries, but more rugose; and densely downy at the back. Flower-stalks solitary, simple, longer than the leaves. Bracteas scattered. Flowers drooping, large and handsome. Calyx three quarters of an inch long, funnel-shaped, downy and bristly; as far as we can judge from the dried specimens it seems of a fine crimson; its segments lanceolate, ribbed, erect, full twice as long as the tube. Petals half the length of these segments, erect, pale, obtuse. Stamens the length of the calyx. Anthers large, oblong-heart-shaped, pointed. Germen covered with prominent, glandular bristles, which harden, as the fruit advances, into stiff, sharp spines, so that whatever its flavour may be, it seems perfectly inaccessible, in the common way of eating gooseberries.

27. *R. rotundifolium*. Round-leaved Carolina Gooseberry. Michaux Boreal-Amer. v. 1. 110. Pursh n. 11.—Prickles solitary under the buds. Leaves nearly orbicular, slightly downy; lobes roundish, obtuse. Stalks single-flowered. Limb of the calyx tubular. Fruit smooth." Native of the high mountains of Carolina. Michaux.

28. *R. hirtellum*. Small-leaved Canada Gooseberry. Michaux Boreal-Amer. v. 1. 111. Pursh n. 12.—Prickles solitary under the buds, small. Branches somewhat hispid. Leaves three-cleft half way down, slightly notched. Stalks single-flowered. Fruit smooth.—Found among rocks, on the Allegany mountains; from Canada to Virginia, flowering in May and June. Pursh. Leaves small. Berries red.

29. *R. gracile*. Slender-stalked Blue Gooseberry. Michaux Boreal-Amer. v. 1. 111. Pursh n. 13.—Prickles solitary under the buds, very short. Leaves acutely lobed and cut, downy on both sides. Footstalks slender. Flower-stalks capillary, erect, mostly two-flowered. Calyx bell-shaped. Fruit smooth.—On rocks, and in mountain meadows, from New York to Carolina, flowering from April to June. Calyx smooth. Berries purple or blue, of an excellent taste. Pursh.

30. *R. flamineum*. Scarlet-flowered Californian Gooseberry.—Branches finely hispid. Prickles several under each bud, unequal. Leaves rounded, slightly three-lobed, smooth. Stalks two-flowered. Calyx hemispherical; limb in very long parallel segments. Petals equal to the limb. Stamens thrice as long.—Gathered by Mr. Menzies in California. Branches brown, clothed with copious, extremely fine, prominent, capillary bristles. Prickle under each bud rigid and sharp, about one-third of an inch long, with several smaller deflexed ones at the base. Leaves not an inch long, quite smooth, veiny; paler beneath; orbicular and entire, except three very slight, scarcely notched, obtuse lobes, at the extremity. Footstalks short, smooth. Flower-stalks longer than the leaves, hispid, glandular, two-flowered, with a single roundish bractea. Flowers scarlet. Calyx with a very short hemispherical tube, hispid like the germen; its limb five times as long, in five oblong, parallel, smooth segments. Petals of the same length, but rather paler and more obtuse. Stamens capillary, straight, parallel, projecting (four of them at least) with the style, full an inch out of the flower; the fifth is perhaps abortive. We know nothing of the fruit of this beautiful species, whose flowers have the aspect of a *Fuchsia*.

31. *R. triflorum*. Three-flowered Mountain Gooseberry. Willd. Hort. Berol. v. 1. 61. t. 61. Pursh n. 14.—Prickles solitary under each bud. Leaves smooth, three or five-lobed, notched. Stalks about three-flowered. Petals spatulate, undulated. Style prominent, hairy, divided.

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Fruit smooth.—On the Blue mountains; from Pennsylvania to Virginia, flowering in May and June. *Pursh.* The *partial flower-stalks* are very long. *Braçæas* very short. *Flowers* yellowish-green, with white *petals*. *Berries* pale red, small.

32. *R. oxycanthoides*. Hawthorn-leaved Gooseberry. Linn. Sp. Pl. 291. Willd. n. 15. Ait. n. 13. Pursh n. 15. (*Grossularia oxycanthæ foliis amplioribus, e sinu Hudsonio*; Dill. Elth. 166. t. 139.)—Branches clothed with bristly prickles; those under the buds larger, mostly solitary. Leaves smooth, three-lobed, notched. Stalks one or two-flowered, shorter than the footstalks. Fruit smooth.—Native of rocky places at Hudson's Bay, Canada, New York, &c. flowering in April and May. It is said to have been cultivated in England in 1705, and was certainly in the Eltham garden near thirty years after. This resembles the common gooseberry in habit, but the *branches* are covered with innumerable, fine, bristly, not very rigid prickles, besides the larger ones, proper to this section of the genus, which are mostly solitary under each bud. *Leaves* larger, more deeply cut than in our gooseberries, smooth. *Flowers* drooping, one or two on each stalk. *Fruit* globose, the size of a black currant, purple, or almost black, with a carulean bloom on the surface; slightly acid.

33. *R. lacustris*. Swamp Cluster Gooseberry. "Perf. Syn. v. 1. 252." Pursh n. 16. (*R. oxycanthoides*; Michaux Boreal-Amer. v. 1. 111.)—Branches clothed with bristly prickles; those under the buds numerous, aggregate, pungent.—Leaves deeply lobed, doubly notched. Clusters downy, drooping, many-flowered. Fruit hispid.—Found in swamps, on the mountains, from Canada to Virginia, flowering from April to June. *Pursh.* Many persons have confounded this with the last, and we are not sure that the two are distinguished by our leading gardeners. We received specimens of the present from the Edinburgh garden, so long ago as 1782, with the name of *R. oxycanthoides*. Another, in the herbarium of the younger Linnæus, is marked *armatum*; an excellent name, given, we believe, by sir J. Banks or Dr. Solander, who could not overlook the characters which so clearly distinguish this from the true *oxycanthoides*. These are not only the deeply divided vine-like *leaves*, but the numerous, combined, ascending *prickles*, almost palmate at their base, which stand under each leaf or bud; and also the long hairy glandular clusters of *flowers*, with a prickly *germen* and *fruit*. The *branches* are beset with abundance of rigid prickly bristles, rather stronger than those of *oxycanthoides*. The *flowers* are of a dull, tawny, yellowish-green. "*Berries* amber-coloured, or brown." *Pursh.*

34. *R. cynosbati*. Thorny-fruited Cluster Gooseberry. Linn. Sp. Pl. 292. Willd. n. 16. Ait. n. 14. Pursh n. 17. Jacq. Hort. Vind. v. 2. t. 123.—Branches smooth. Prickles one or two under each bud, simple. Leaves five-lobed, downy beneath. Clusters drooping, of few flowers. Fruit armed with strong thorns.—On the sides of hills and rocks, in the Allegany mountains, and in Canada, flowering from April to June. *Flowers* green. *Berries* dark brown, and covered with thorns. *Pursh.* Miller cultivated this species at Chelsea, where we believe it still remains. The *leaves* are downy on both sides, but especially beneath. *Prickles* mostly solitary, variable in size; those on the large globular fruit are peculiarly strong.

We have thus more than doubled Willdenow's catalogue of species, in this genus. Some of the newly discovered ones, from North America, are likely to prove great acquisitions to our kitchen gardens, provided they bear fruit in this climate; of which, till the experiment is fairly made, there must always be some uncertainty.

RIBES, in *Gardening*, contains plants of the hardy, deciduous, shrubby kind, of which the species cultivated are; the common currant (*R. rubrum*); the common black currant (*R. nigrum*); the rough-fruited gooseberry (*R. grossularia*); the smooth-fruited gooseberry (*R. uva crispa*); the procumbent gooseberry (*R. reclinatum*); the hawthorn-leaved currant (*R. oxycanthoides*); and the prickly-fruited currant (*R. cynosbati*).

It is observed by Martyn, that the first sort is very apt to be infested with the aphis ribes, in which case the green leaves become red, pitted, and puckered. It has been long cultivated in the garden, and greatly improved. There are several varieties; as the common sort, with small red fruit; with white fruit; with pale fruit, commonly called the Champaign currant, differing only in being a pale red or flesh-colour. But since the white and red Dutch currants have been introduced and become common, the old sorts have been almost banished, and are now rarely to be found. And Mr. Forfyth mentions the fine new white Dutch, long-branched red, striped-leaved red-white currant, and large pale and red Dutch.

There are also the sweet currant, the small-fruited currant, and a variety with blotched leaves, which is kept in some plantations; but as the variegation is apt to go off when the plant is vigorous, it scarcely deserves a place in them.

Of the second there is a sort often termed the American black currant. The berries have a very peculiar flavour, which many persons dislike; but are commonly eaten in puddings in some parts, and make a tart little inferior to the cranberry. The juice of which is also frequently boiled down to an extract, with the addition of a small proportion of sugar; in this state it is called rob, and used in sore throats and other diseases.

Currants in general are by some supposed the most useful of all the small fruits, as serving either for table or culinary uses, as well as for wine, and continuing long in succession with due management. The black sort is seldom sent to table as a fruit for that purpose. But it is a sort which may be infused in spirit of any kind, in which way they make a good liquor.

The third, or rough-fruited, sort is a low branching shrub, which has the berries pendulous and hairy. And it is observed by the editor of Miller's Dictionary, that if the bractæas do not distinguish this from the following, the roughness or smoothness of the berries will hardly do it, as Mr. Robson has found that seeds from the same plant will produce both rough and smooth fruit. He cannot regard them as different species.

The fourth, or smooth-fruited, sort has the berry pulpy, subdiaphanous, pale, amber-coloured, red or purple, smooth, and the pulp watery and sweet. And Martyn remarks, that the gooseberry seems to have been formerly a fruit in very little esteem, but has received so much improvement, that it is now become valuable, not only for tarts, pies, and sauces, both fresh and preserved in bottles, but as an early desert fruit, and preserved in sugar for winter use to answer the same purpose.

It may be noticed, that the most important varieties of the red kind are, the hairy, smooth, deep red, damson or dark red, blueish, red raspberry, early black-red, Champaigne, &c. Of the green kind; the hairy, smooth, Gascogne, raspberry, &c. Of the yellow kind; the great oval, great amber, hairy, amber, early amber, large tawny or great mogul, &c. And of the white kind; the common, white-veined, and large crystal. But besides these, there is the rumbullion, large ironmonger, smooth ironmonger, hairy globe, and innumerable

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innumerable others, some of very large size, annually raised from seed, weighing from ten to fifteen pennyweights; however, there are small ones better tasted. There are said to be upwards of two hundred, at least in name.

And Mr. Forfyth has given the following list from the catalogue of Messrs. Kirk, nurserymen, at Brompton, near London.

The supreme red, perfection red, high sheriff of Lancashire, royal George, unicorn, rough amber, white walnut, Ackerley's double bearer, royal oak, Miss Bold's, sparkler, Ackerley's Rodney, Hampson's Cæsar, Monk's Charles Fox, St. John, pigeon egg, Worthinglowe's conqueror, golden eagle, Royder's triumph, Williamson's yellow hornet, Swingham, Jackson's golden orange, Goliath champion, hairy amber, Nixon's golden eagle, Worthington's white lily, Laylord's seedling, Nixon's white heart, Riding's old England, Bakeley's Swingham, Tillotson's St. John.

The same writer also adds another list of the largest new sorts which were shewn in Lancashire, in the summer of 1800, with their colour and weight, as communicated by Messrs. McNiven, nurserymen, Manchester.

Red Sorts of Gooseberries.

	dwt.	gr.
Alcock's king	16	15
— duke of York	16	1
Boardman's royal oak	15	4
Brundrit's atlas	17	1
Chapman's peerless	15	21
Dien's glory of England	16	2
Fairlow's lord Hood	14	5
Fisher's conqueror	17	19
Fox's jolly finoker	15	8
Hall's porcupine	13	20
Lomax's victory	16	11
Mason's Hercules	13	16
Taylor's volunteer	16	17
Worthington's glory of Eccles	14	10

Yellow Sorts of Gooseberries.

Brundrit's fir Sidney	15	22
Davenport's defender	15	12
— creeping Ceres	16	0
Hamnet's Kilton	15	9
Hill's golden gourd	13	17
— royal sovereign	17	10
Leigh's prince of Orange	15	0
Parkinson's goldfinder	14	5
Robinson's crudus	13	17
Withington's sceptre	13	7

Green Sorts of Gooseberries.

Blakeley's chissel	17	0
Boardman's green oak	14	1
Brundrit's tickle Toby	14	6
Chadwick's hero	13	10
Dean's lord Hood	15	10
Mill's Langley-green	16	2
Read's satisfaction	15	4
Robinson's stump	13	21
Smith's green mask	13	20
Yates's duke of Bedford	14	11

White Sorts of Gooseberries.

Adam's snow-ball	12	22
Atkinson's white hall	14	8

Chapman's Highland white	-	-	dwt. gr.
Davenport's lady	-	-	12 0
Gibson's Apollo	-	-	15 0
Holding's white muslin	-	-	14 20
Kenyon's white noble	-	-	13 0
Moor's white bear	-	-	13 6
Woodward's white smith	-	-	14 12
	-	-	17 2

It is observed, that in favourable seasons, many of the above sorts have been known to weigh more by several pennyweights.

In all the south-eastern parts of Lancashire there are a great number of little societies held by the labouring and manufacturing workmen, and the gardeners; where these sorts of fruits are annually exhibited, under many different arbitrary names and designations, as *Goliaths*, *golden drops*, &c. and their merits and capabilities of improvement finally settled and decided upon.

The fifth sort has the fruit when ripe commonly dark purple, but sometimes red or even yellow.

In the sixth kind the fruit is small and round, the size and shape of a currant; the colour at first purple, but when ripe, dark purple with a blue bloom; it is smooth, on a short slender stalk.

Method of Culture in the Currant Kind.—In general these may be raised with great facility from layers, seed, cuttings, and in other ways. In the first of these modes, when the trees are cut low, Mr. Forfyth advises the laying down some of the branches either in the winter or spring seasons, when the ground in the quarters or rows is dug, which should always be done annually. In the autumn following, these layers will have made fine roots; then they may be taken off, and planted out where they are to stand, and they will mostly bear fine fruit in the following summer.

But in the second method, the cuttings should be chosen of the strongest and straightest shoots, which should be cut six or eight inches in length, and be planted out on an east or north border, in the early autumn, at the distance of a foot from row to row, leaving only a few inches out of the ground. In this way they may be kept perfectly free from weeds. In dry weather, during the spring, they should be often refreshed with water. Some also raise these plants from suckers; but this is a method that should be avoided as much as possible, as they never grow handsome, and are apt to throw out suckers afterwards.

With respect to the seed, it should be sown on a border where the mould is fine, either in the autumn or early in the spring; and the young plants, when they appear, be kept free from weeds. When they have attained sufficient growth, they may either be planted out where they are to remain, or be set out in nursery-rows. However, Mr. Forfyth observes, that under the bushes that have been covered for late fruit, plenty of self-sown plants may constantly be found, which he advises to be planted out by themselves. And those who make currant-wine may, he thinks, save the seed, after the fruit is squeezed, and dry it: it may then be sown in the manner directed above, by which, most probably, some fine varieties may be obtained. As in many gardens there still remains, the same writer remarks, a small sort of red and white currant not worth cultivating, he would advise those who have any of them to root them up, and plant in their room the large red and white Dutch, the long-bunched red, and Champagne large pale red. These kinds of plants may be planted out, it is suggested, either in the quarters, or single rows round the edges of the quarters, in the gardens or other places. And he would particularly

RIBES.

particular-ly recommend planting a few against a south or west wall, or paling, which will produce fruit much earlier than in the quarters, &c.: also to plant some between other fruit-trees, on north walls, or palings, for later crops. These may be covered with double nets, to preserve them from birds; tucking in a few fern branches between the two nets, which will prevent the heat of the sun and drying winds from shrivelling the fruit. In the quarters they should be covered with mats, for the same purpose; at the same time permitting all the leaves to remain on the bushes, to shade the fruit, and make it keep the longer in a proper state.

In what respects the pruning of the bushes, the work may, according to the above author, be begun in the month of November, and continued till March, as it suits the planter's convenience. And they should never be left too thick of wood; but a great deal depends on the management of them in summer, to have strong and fine wood for the following season. If they have been neglected for some years, and suffered to run up to long naked wood, they must, in his opinion, be cut down near the ground: they will then send forth fine strong shoots. In this case, he would recommend heading down every other tree, and cutting the others partially, by taking out every other branch as near as can be to the ground, unless they are trained up with single stems; in which case, it will be necessary to cut them as near as possible to where the branches begin to break out and form the head. And in the winter pruning, the strongest and finest shoots should be preserved, leaving them from nine to eighteen inches long, according to their strength, and from eight to ten inches apart, and as regular as possible from top to bottom of the tree; taking care to cut out all the dead and weak shoots. And particular attention should be paid in summer, keeping the middle of the bush open to admit the sun and air; preserving the finest and strongest shoots that are nearest the stem. Some, he remarks, are fond of training them up with single stems, to a considerable height, to form fine round heads, which are very ornamental, if not suffered to run up too high; as, in that case, they are liable to be broken by the wind, if not well supported by stakes. Care must be taken not to let the shoots run to more than six inches long, because such short shoots will not be so liable to be damaged by the wind as long and weak ones are, especially when loaded with fruit. He prefers dwarfs from three to four feet high.

Further it is added, that the same manner of pruning, &c. will do for black currants; but as they grow stronger than the red or white, the shoots should be left thinner, and laid in longer, which will make them produce larger and finer fruit. And those against walls and palings should have the shoots laid in thinner than those in the quarters, and trained as horizontally as possible; shortening them, in the winter pruning, to a foot or eighteen inches, according to the strength of the shoots.

As this sort of fruit is very liable to be devoured by earwigs, which take shelter under their leaves and branches, bundles of bean-stalks should, he suggests, be hung up some time before the bushes are covered with mats or nets. If proper attention be not paid to this, the fruit will generally suffer very much from these insects. After the bushes are covered, take the mats off once in three or four days, and kill the earwigs that have got in the bean-stalks, which it will be necessary still to keep hung up. As there is a sweetness in the inside of bean-stalks, which attracts the earwigs, they very readily take shelter in them from rain. By proper attention to these directions, these destructive insects may be kept under, and the greater part of the fruit be

preserved. It is also necessary to carefully stock up all suckers at the roots of the trees, and keep them as clean as possible; otherwise they will prevent the sun and air from penetrating to the roots, and greatly weaken and injure the trees.

These plants are very liable to be infested with aphides, and other insects, from which they should be freed as soon as possible, by proper picking, washing, and liming.

Culture in the Gooseberry Kind.—All these are capable of being raised by cuttings and layers, as well as seeds for new varieties. They are likewise sometimes increased by suckers; but this last is not an adviseable method, as the plants raised in this way are more apt to throw out suckers than those from cuttings or seed. The cuttings should be made from the strongest and cleanest shoots, and have the length of seven or eight inches, being planted out in the early autumn, in a border which has an eastern or northern aspect, at the distance of about a foot from row to row, and having only about three or four inches of each cutting above the ground; as by this means they may be kept clean by hoeing. They require to be frequently watered in the spring season, when the weather is dry.

Also the layers may be laid down any time in the autumn or spring season, in the common way, when they readily strike root; and in the following autumn, may be taken off, and planted out where they are to remain, or in nursery-rows, to get strength to be finally planted out.

And the seed obtained from the ripened berries should be sown in the autumn, or very early spring, in a bed of fine light mould. The plants come up readily, and should be kept perfectly clear from weeds; and when they have had one or two years' growth, may be removed into nursery-rows, in the same manner as the currants, to remain till they become fit for being planted out. In this way good new varieties may be procured. Mr. Forsyth remarks, that the gardeners in the vicinity of Manchester have made great additions to the varieties of this fruit; and by mixing up a rich soil to plant them in, carefully watering, shading, and thinning the fruit, have brought the berries to a size much larger than had been before met with in this country; but that those of some of the layers are much thicker in the skin, and not so well flavoured as many of the old sorts.

In most parts of Lancashire, this is indeed a kind of fruit which is uncommonly fine, and of a very large size, in both the red and white kinds; and in many of the southern and south-eastern parts, very great attention, in numerous instances, is bestowed in the cultivation and improvement of it, so as to render it of an unusual magnitude and fine appearance. This is chiefly effected by much more pruning and thinning than that which is generally had recourse to with these sorts of plants, frequent digging about them, and a very liberal use of well rotted stable dung incorporated with the mould which is applied near their roots.

As to the methods of planting out this sort of plants, they are extremely various. According to Mr. Forsyth, the market gardeners in the vicinity of the metropolis set them out in rows from eight to ten feet apart, and six from plant to plant. In cases of this sort, he recommends that they should be pruned in the autumn, as about the beginning of October, when the ground between them may be planted with coleworts, or beans for a spring crop; and by so doing, there will be no occasion to tread over the ground, and hurt the coleworts, in pruning the bushes; as, before the gooseberries begin to shoot, the coleworts will be all cleared off the ground. And after this time, (or before, if you find it convenient,) a good coat of rotten dung should

be laid on the ground; then dig it, and plant early potatoes, but not so near as to hurt the gooseberries by their growth. He likewise advises that the roots of gooseberries should be kept clear to admit the sun and air. In small gardens, he would recommend planting them in a quarter by themselves, at the distance of six feet between the rows, and four feet from plant to plant: they may be planted round the edges of the quarters, about three feet from the path; in which case, the ground will be clear for cropping, and a man, by setting one foot on the border, can gather the gooseberries, without injuring the crop that may be on the border. Also that, as they like a rich soil, they should be dunged every year, or at least have a good coat of dung once in two years. They should never be planted under the shade of other trees, as it injures the flavour of the fruit.

And in respect to the pruning of the bushes, it is a practice too common, Mr. Forfyth thinks, to let them branch out with great naked stems, suffering them to remain in that state for years. When that is the case, they should be cut down near to the ground in the winter pruning, as it will make them throw out fine strong healthy shoots, which will bear fruit the second year; and as gooseberry bushes, in general, bear their fruit on the second year's wood, great care should be taken in summer to keep the middle of the bush clear, to admit a free air, leaving the finest and strongest shoots from six to ten inches distant from each other. This will, he conceives, help to ripen and harden the wood. It is a practice with some to shorten the shoots in the autumn or winter pruning, which should be always near to a wood-bud; which may be known by its being single, whereas fruit-buds are in clusters. The shoots may, he thinks, be shortened to eight or ten inches, according to their strength. Some leave them at full length for three or four years, thinning out those that are superfluous. He advises always to leave a proper number to be trained up between the full length shoots, to succeed them when they are tired of bearing; and then to cut the old ones down to the young ones that are to succeed them. By these means, the bushes may always be kept in a constant state of bearing. Those branches which were cut the first year will, in the second, throw out short dugs, or spurs, which produce the fruit; and these should by no means be cut off, unless the branches are in a sickly state, and require to be cut close down, when the bushes are overloaded with fruit. It will then, in his opinion, be necessary to cut out a good deal of the old wood, to assist nature to recover herself, after producing so great a quantity of fruit.

He likewise advises that great attention be paid to the cultivation of the early and late sorts. In some old gardens, in particular, there are, he observes, very valuable sorts that have been of late too much neglected; he would therefore recommend to those who live in the neighbourhood of such gardens, to observe their time of ripening, and to cultivate those especially which are early and late. And he adds, that it is a practice with some to clip the tops of gooseberries with a pair of garden shears, as they would clip a thorn hedge; this he by no means approves of, as the fruit will not be half the size, nor of so fine a flavour, as when the bushes are kept clear of such wood as is unnecessary.

Farther it is recommended that great care should be taken in spring and summer to stock, or grub up, all the suckers from the roots of the bushes, leaving their stems clear and unnumbered. And as many of the Lancashire sorts are apt to grow horizontally, and the branches frequently trail on the ground, which renders them liable to be broken by high winds, especially when they are loaded with fruit, he would recommend two or three hoops to be put round them, to

which the branches may be tied, to support them, and prevent their being broken by the wind, or any other means.

In cases where it is wished to have them late, they should be planted on north walls and palings, between the other trees, when they may be removed as the trees begin to meet. If laid in thin, they will bear very fine and handsome fruit. He would advise to plant the finest late sort; as by this method the table will be supplied much longer than by the common custom of planting in quarters of the garden.

Also immediately after pruning, he always applies the plaster composition to the ends of the shoots and cuttings; and he finds it of great use in preventing the exhalation of the sap, and preserving the cuttings till they take root, and become established.

It may be observed that these sorts of plants are very much infested with a small green caterpillar, which frequently devour both leaves and fruit: great attention is of course necessary to observe their first appearance on the bushes; as, if not destroyed early, they increase so fast, that they soon devour all the leaves, and the fruit is good for nothing. It is noticed, that they first appear generally on the edges and under-sides of the leaves. In order to destroy them, he advises to take some sifted quick-lime and lay it under the bushes; but not at first to let any of it touch the branches or leaves; then shake each bush suddenly and smartly, and the caterpillars will fall into the lime; if the bush be not shaken suddenly, the caterpillars, on being a little disturbed, will take so firm a hold as not easily to be shaken off. After this is done, some of the lime should be sifted over the bushes; this will drive down those which have lodged on the branches. The caterpillars ought, in his opinion, to be swept up next day, and the bushes well washed with clear lime-water mixed with urine; this will destroy any caterpillars that may still remain, and also the aphides, if there are any on the bushes at the time.

Forcing.—It may be stated, that sometimes trees of the gooseberry and currant kinds are forced for early fruiting, by means of artificial heat in fruit-forcing-houses, hot-walls, or forcing-frames, &c. For this purpose, some young trees should be planted in largish pots, one plant in each, and being advanced to a full state of growth for plentiful bearing, should be introduced in any of the above forcing departments that are in work by fire, or hot-bed heat, or both, in forwarding any principal sorts of fruit-trees, plants, or flowers, at the proper season, as about January or February, in which the same culture, in regard to the degree of heat, and other requisites, necessary for the other trees, &c. is suitable for these. Water should be given occasionally to the earth in the pots, and sometimes after the fruit is set, throwing it lightly over the branches on a warm sunny day; and they will thus produce ripe fruit in April or the following month.

However, the forcing of this sort of fruit is now seldom much attended to, in consequence of other finer sorts being so common.

RIBES, in the *Materia Medica*. The *ribes rubrum* or *rutulum*, i. e. the red currant, and the *ribes album*, or white currant, are varieties of the same species, and therefore the fruit of both, considered in both a botanical and medical sense, is perfectly analogous. The red currant is abundantly cultivated in our gardens, from which we are supplied with the fruit; and this, on account of its grateful acidity, is universally acceptable, both in its natural state, and as variously prepared by art with the addition of sugar. The juice is a most agreeable acid in punch. If equal weights of picked currants and pure sugar are put over the fire, the liquor

liquor that separates spontaneously is a most agreeable jelly. The juice of red currants, with sugar, is a common beverage at Paris, where it is generally preferred to orange or lemonade. Dr. Cullen classifies this fruit with the alimentary plants, and being generally and exclusively considered as such, it was not received in the British catalogues of the *Materia Medica* till that published in a late collection of the London Pharmacopœia: but it is omitted in the last edition. The medicinal qualities of red currants appear to be similar to those of the other subacid fruits, which are esteemed to be moderately refrigerant, antiseptic, attenuant, and aperient. Hoffman and Boerhaave had great confidence in the efficacy of these fruits in obstinate visceral obstructions. They may be used with considerable advantage to allay thirst in most febrile complaints; to lessen an increased secretion of bile; and to correct a putrid and scorbutic state of the fluids, especially in sanguine temperaments; but in constitutions of a contrary kind they are apt to occasion flatulency and indigestion.

The *ribes nigrum*, or black currant, has berries larger than those of the red; and besides possessing the properties in common with the "fructus acido-dulces," they are also said to be peculiarly useful in sore throats; and to manifest a diuretic power in a very considerable degree. In cases of inflammatory angina, they may be advantageously employed to answer the same intentions as gargles, and from their efficacy in this respect they have acquired the name of "Squinancy berries," but the proofs of their diuretic powers seem to want confirmation. With respect to their former application and utility we may observe, that the black currant jelly in common domestic use is rendered less efficacious by having too much sugar in its preparation. The fruit both of this, and of the red currant, afford a pleasant wine; and that made of the former is mentioned by Haller, "ex eo optimum vinum fieri non deterius vinis verioribus vitis, quando annuum est." The leaves of the black currant are extremely fragrant, and have been recommended for their medicinal virtue; which Bergius states to be "mundificans, pellens, diuretica." An infusion of these leaves is said to have the taste of green tea, and when prepared from the young leaves, is to some people very agreeable. The official preparations of the black currant berries in the late London Pharmacopœia (but omitted in the last edition) were the "Syrupus ribis nigri," and the "Succus ribis nigri inspissatus." Woodv. Med. Bot. See CURRANTS.

RIBIERS, in *Geography*, a town of France, in the department of the Higher Alps, and chief place of a canton, in the district of Gap; four miles N.W. of Sisteron. The place contains 1301, and the canton 3939 inhabitants, on a territory of 180 kilometres, in nine communes.

RIBNA, a town of Russia, in the government of Kollivan, on a river of the same name; 112 miles S.E. of Krasnoiarsk.

RIBNIK, a town of Silesia, in the principality of Ratibor; 13 miles E. of Ratibor. N. lat. $50^{\circ} 3'$. E. long. $18^{\circ} 30'$.—Also, a town of European Turkey, in Walachia, on the Alant; 44 miles S. of Hermanstadt. N. lat. $45^{\circ} 19'$. E. long. $24^{\circ} 8'$.—Also, a town of European Turkey, in Walachia, on the Ribnik, otherwise Rymnick, as it is called by the Russians; the see of a Greek bishop. From a severe battle fought here in 1789, between the Austrians and Russians against the Turks, Suwarrow, who commanded the Russians, and defeated them, was created by the emperor Leopold, a count of the empire, invested with the order of St. Andrew, and honoured with the title of Rymniski by the empress Catharine; 100 miles S. of Jassi. N. lat. $45^{\circ} 36'$. E. long. $27^{\circ} 4'$.—Also, a river of Walachia, which

runs into the Siret, near Dubravitzza, on the borders of Moldavia.

RIBNITZ, a town of the duchy of Mecklenburg, situated on a large lake, near the mouth of the Reckenitz; 12 miles N.N.E. of Rostock. N. lat. $54^{\circ} 17'$. E. long. $12^{\circ} 35'$.

RIBNITZY, a town of Poland, in the palatinate of Braclaw; 64 miles S. of Braclaw.

RIBNO, a town of Prussia, in the province of Oberland; 15 miles N.N.E. of Ortelburg.

RIBNOI, a town of Russia, in the government of Jaroslavl; 40 miles W.N.W. of Jaroslavl. N. lat. $57^{\circ} 45'$. E. long. $39^{\circ} 14'$.

RIBS, in *Anatomy*, the bones forming the sides of the chest, attached to the spine behind, and terminating in front in portions of cartilage, some of which are fixed to the sternum, the others not. The former are called *true*, the latter *false* ribs. They are described in the article LUNG of this Cyclopædia.

RIBS, *Fractures of the*, in *Surgery*. See FRACTURE.

RIBS of *Fish*. There is a very great variety in the shape and other peculiarities of the ribs of fish. They are in some smooth, and flattened sideways, as in the cyprini; in others they are rounded, as in the cotti and gadi. In the cyprini the several species have from thirteen to nineteen ribs on a side, and the vertebræ are from thirty-seven to forty-nine in number, differing greatly in number in the several species of the same genus. The ribs in many fish adhere to the vertebræ, by means of cartilages, and seem only continued parts of them; but in others they are free and loose, and do not so much as touch the vertebræ. We find instances of the first sort of structure in the cyprini, salmons, &c. and of the other in the perch, the gadi, and the pleuronectæ. In the spinose fishes, the last vertebra always is terminated by a pair of broad apophyses placed perpendicularly, and touching one another, and by means of cartilages these are fixed to the bones of the tail. Artedi Ichthyolog. See *Anatomy of FISH*.

RIBS, a figurative expression for the timbers or frames of a ship, arising from the comparison of it with the human body, as the keel with its keelson, to the back-bone, and the timbers to the ribs; for the former unite and support the whole fabric, since the stem and stern-frame, which are raised on the ends of the keel, may be said to be a continuation of it, and serve to connect and inclose the extremities by the hawse-pieces forward, and the transoms abaft, as the keel forms and unites the bottom by the floor-timbers. The idea, if carried further, may in a manner represent the muscular parts of the human fabric; for the wales, clamps, and thickstuffs, at the different heads of the timbers, are as so many muscles or strong ligaments to connect the ribs together, while the planking of the bottom and top-sides, which is thinner, may be compared to the skin or covering of the whole; and hence planking is often termed, *skimming* the ship.

RIBS of a *Parrel*, short flat pieces of wood hollowed on the back, having a hole near each end, through which the parrel rope is reeved. See PARREL.

RIBS, among *Jewellers*, the lines or ridges which distinguish the several parts of the work, both of brilliants and roses.

RIB-WORT, in *Botany*. See PLANTAIN.

RICA, among the Romans, a veil with which the ladies covered their heads.

RICÆ, *ῥίξες*, surgical bandages for the head.

RICARD, DOMINIC, in *Biography*, was born at Toulouse in 1741, and entered into the congregation of the Christian

Christian doctrine, and became a distinguished professor in it. He quitted the society after some years, and took up his residence at Paris, where he employed himself in instructing youth, and in literary pursuits. He was celebrated for his deep knowledge in the Greek language, and engaged in the great task of translating the whole works of Plutarch. Between the years 1783 and 1795 he published his version of that philosopher's moral works, in 17 vols. 12mo. : of the Lives he only published 4 vols. 12mo. He published likewise a poem, entitled "La Sphere," in eight cantos, 8vo. 1796, which contains a system of astronomy and geography, enriched with notes, and notices of Greek, Latin, and French poems, treating on astronomical subjects. Ricard died in 1803. He was distinguished by modest merit, and the practice of all the social virtues.

RICAUT, *Sir PAUL*, was the youngest son of *Sir Peter Ricaut*, knight, supposed to be a merchant in London. The time and place of the birth and education of the subject of this article are not known, but he appears to have travelled during several years in Europe, Asia, and Africa. In the year 1661 he went out as secretary to the earl of Winchelsea, the ambassador extraordinary to the Ottoman Porte. Here he remained eight years in that post. In 1663 he published the treaty or capitulation concluded between Charles II. and the Turkish sultan, in which was the favourable article, that English ships should be exempted from search for foreign goods. When his connection with the Porte was expired, he was appointed English consul at Smyrna, an office which he held about eleven years, to the entire satisfaction of the Turkey company, and with the respect and attachment of all the Europeans in that city. Upon his return, he employed himself in literary occupations till the year 1685, when he accompanied the earl of Clarendon, lord-lieutenant of Ireland, as his secretary for Leinster and Connaught. He was nominated by James II. one of his privy-council for Ireland, and judge of the admiralty court, and received the honour of knighthood. After the revolution, he was sent by king William as his resident to the Hanse towns, in which post he continued ten years. He died in England, in the year 1700, literally worn out with age and long services. Independently of his high character as a diplomatist, he was celebrated for his knowledge of the learned languages, and also of the modern Greek, the Turkish, the Italian, Spanish, and French. As an author, he is known by "The present State of the Ottoman Empire;" "The present State of the Greek and Armenian Churches;" "A Continuation of Knolles' History of the Turks." He continued "Platina's Lives of the Popes" to his own time. He translated from the Spanish, "The Royal Commentaries of Peru, by Garcilasso de la Vega." A paper of this author is inserted in the Transactions of the Royal Society, of which society he was a member. *Biog. Brit.*

RICCATI, VINCENT, a learned Italian Jesuit, was born at Castel-Franco, in the territory of Treviso, about the year 1707. His genius inclining him chiefly to the study of the mathematical sciences, he cultivated them with so much success, that his superiors selected him as a proper person to teach them to others. He accordingly was chosen professor in the college at Bologna, which he filled with reputation till the suppression of the order in 1773. He died in 1775, leaving behind him several works that testify his high merit as a scholar, among which is "A Treatise on the Integral Calculus," in 3 vols. 4to. He did not confine himself to the abstract mathematics, but paid much attention to the study of hydraulics; a branch of science of the utmost importance in all the northern Italian states, where the

many and rapid rivers expose the country to continual inundations. In this line he appears to have rendered considerable service to the Venetian territories; so much so, that in 1774 a gold medal was struck in his honour.

RICCI, BARTHOLOMEW, a learned Italian, was born at Lugo, in Romagna, in the year 1490. He studied under Amaseo in Bologna, and for further improvement visited Padua and Venice. He passed some years in the house of Giovanni Cornaro, as preceptor to his son, who was afterwards a cardinal; and for some time kept a school at Ravenna. Through the recommendation of Calcaquini, he was invited, in 1539, to the court of duke Hercules II. of Ferrara, to undertake the education of the princes Alfonso and Luigi. He there acquired the affection of his pupils, and the esteem of the learned. He died at the age of 79, in the year 1569. The principal works of Ricci are "Orations," and "Epistles," the Latin style of which has been much applauded, as a happy imitation of that of Cicero. The most laborious of his works is entitled "Apparatus Latinæ Locutionis," being a Latin lexicon, in two parts; the first containing the verbs, and the second the nouns with which they are joined. It was printed at Venice in 1535. Ricci also wrote a comedy in Italian prose, entitled "Le Balie," which is well spoken of; and some Italian poems, which have appeared in collections.

RICCI, MATTHEW, an eminent missionary, was born of a good family at Macerata, in 1552. He was sent to study the law at Rome, where, at the age of 19, he entered into the society of Jesuits. He had not completed his theological studies, when he followed to the East Indies his preceptor, father Valignan. During his abode at Goa, he applied assiduously to the language of China, to which country he was destined. In 1583 he arrived at Caoquin, in the province of Canton, where he settled with some brethren. To ingratiate himself with the Chinese, he made a map of the world, in which, whilst he corrected their prejudices with respect to the relative dimensions of their country, he complied with them by altering the meridian, so as to place it in the centre. It was not till 1600 that he was able to gain access to the emperor at Peking, employing the pretext of bringing him a present of curiosities from Europe. He was well received, and permitted to settle in that capital, where his mathematical skill rendered him acceptable to the court and men of letters. He purchased a house there, and built a church; and the progress, such as it was, which Christianity made in the metropolis of China, was greatly owing to his exertions. He died there in 1610, leaving curious memoirs on China, of which father Trigault made use in his work "De Christiana Expeditione apud Sinas."

RICCI, MICHAEL-ANGELO, an Italian cardinal, and able mathematician, in the 17th century, was descended from a noble family originally from Bergamo, and born at Rome in the year 1619. In the course of his studies, he conceived a powerful inclination for the mathematics, which was confirmed by Torricelli, during the temporary residence of that philosopher at Rome. Under his directions, Ricci's genius was carefully cultivated, and his progress reflected great honour both on the tutor and pupil. After Torricelli left Rome, he maintained a regular correspondence with Ricci, who proved and illustrated in a happy manner several of his new theorems. In the year 1666 Ricci published a little work, entitled "Exercitatio Geometrica," &c. in which he determined, in a purely geometrical manner, the tangents, and the maxima and minima of curves, chiefly compared with conic sections of the first order. This piece was reprinted by the Royal Society of London, as a treatise of

the greatest utility; and it was warmly applauded by some of the most distinguished mathematicians of the age. Having been induced to enter into the church, he relinquished his mathematical pursuits, and wholly devoted his attention to the assiduous study of divinity, and the duties of his new profession. He filled several ecclesiastical stations, and, among others, those of secretary to the congregation of indulgences and of relics, and of confessor of the holy office. In the year 1681, pope Innocent XI. raised him to the purple; an honour which he wished to decline, but was compelled to accept by the pontiff's absolute command. He possessed it, however, only for a short period, as he died in 1682, at the age of 64. One of his "Dissertations" is preserved in cardinal Brancaccio's "Works;" another in Charles Dati's "Epistola ad Philalethos;" and one of his "Letters" in the first volume of the collection, entitled "Lettere Memorabili." Gen. Biog.

RICCI, SEBASTIAN, was born at Belluno, near Trevisano, in 1659; and having discovered an early genius for painting, was conducted by his father to Venice, and placed as a disciple with Fred. Cervelli, a Milanese artist of good reputation, with whom he studied for nine years. He afterwards improved his practice at Bologna, &c. by copying, and obtained the favour and patronage of Rannuccio, the second duke of Parma.

By the liberality of that prince, he was honourably maintained at Rome, studying the productions of the best ancient and modern masters; and there he formed that manner which distinguishes his productions, and exhibits a ready and splendid invention, a free and masterly handling of the pencil, with a full luxuriance of colour, which for a while raised him into the highest esteem, and consequently immense employment.

Having quitted Rome, he returned to Venice, where he was so eagerly solicited for his paintings, that he had scarcely time to take even necessary refreshment. His fame spread through Europe, and he received an invitation to the court of the emperor at Vienna, to adorn the magnificent palace of Schoenbrunn. From thence he was encouraged to visit London, where he was immediately and incessantly employed by the court, the nobility, and persons of fortune. Here he remained ten years, with his nephew and co-adjutor, Marco Ricci, who painted skilfully scenes of architecture and landscape. He acquired great wealth by the immense occupation he found; and then returned to Venice, where he passed the remainder of his days till his 75th year, when he shared the common fate of mortals.

Ricci was one of the few, comparatively speaking, who enjoy during their lives the utmost extent of their fame. In his history, that portion of renown which attaches to him died with him, or nearly so. In fact, he was a machinist, one who, being conversant in the rules of art, and skilful in the application of the means, dazzled where he could not instruct, and deluded by ingenuity without judgment, and art without expression. His works are to be found in many of our great houses, as well as those of his nephew. At Chelsea and at the British Museum there are considerable pictures of his painting, but they do not rise in esteem by continued observation; and yet, unfortunately, they had sufficient influence in their day to lead the artists astray from the contemplation and imitation of the works of Raphael, and the greater masters of the Italian school.

RICCIA, in *Botany*, a cryptogamic genus of plants, named by Micheli after a Florentine Senator of his time, Peter Francis Riccio, President of the Order of St. Stephen, Auditor of the Academy of Pisa, &c.; who seems to have been rather a patron, than a practical cultivator, of

botanic science.—Mich. Gen. 106. t. 57. Linn. Gen. 566. Schreb. 766. Mart. Mill. Dict. v. 4. Schmidel. Ic. t. 44, 45. Hedw. Theor. 116. t. 29. Juss. 8. Lamarck Illustr. t. 877.—Class and order, *Cryptogamia Hepatica*. Nat. Ord. *Alga*, Linn. *Hepatica*, Juss.

Ess. Ch. Male, scattered warts?

Female, German globose, sunk, with the style, in the frond. *Capsule* exposed, globose, crowned with the style, of one cell. *Seeds* numerous, elliptical.

The genuine species of this genus grow on the earth, flourishing in the damp cold season of the year, and disappearing in hot dry weather. Hence they are supposed to be annual. Such are three of the British species; *R. glauca*. Linn. Sp. Pl. 1605. Engl. Bot. t. 2546; *R. minima*. Linn. Sp. Pl. 1605. Mich. Gen. t. 57. f. 6; and *R. crystallina*. Linn. Sp. Pl. 1605. Dickl. H. Sicc. fasc. 15. 20. Mich. Gen. t. 57. f. 3.—These form small glaucous patches on the ground, in sandy or moist places. The other two British species float in fresh water pools; *R. fluitans*. Linn. Sp. Pl. 1606. Engl. Bot. t. 251, whose frond is forked and linear; and *R. natans*. Linn. Syst. Nat. ed. 12. v. 2. 708. Engl. Bot. t. 252, whose inversely heart-shaped form, with copious linear serrated scales, like radicles, beneath, has a very peculiar appearance. Nothing is known respecting the fructification of these two last. *R. fruticulosa* of Dickson is a *Jungermannia*, Engl. Bot. t. 2514, probably a variety of the *furcata*.

RICCIA, *La*, in *Geography*, a town of Italy, in the Campagna di Roma; 1 mile S.E. of Albano.

RICCIA, a town of Naples, in the Molise; 15 miles E. of Boiano.

RICCIARELLI, in *Biography*. See VOLTERRA, DANIEL DA.

RICCIOLI, JOHN-BAPTIST, a learned Italian Jesuit, and an eminent philosopher, astronomer, and mathematician, in the 17th century, was born at Ferrara, a city belonging to the papal jurisdiction, in the year 1598. At the age of 16 he commenced his novitiate in the society of Jesus. When he had completed his course of academical studies, he was selected to teach successively rhetoric, polite learning, philosophy, and scholastic divinity, in the Jesuits' colleges at Parma and Bologna. While he discharged the duties of these appointments with great success and reputation, he devoted his leisure hours to the study of geography, hydrography, chronology, experimental philosophy, and astronomy. During the dispute which took place in his time, respecting the correctness of the Gregorian reformation of the calendar, he insisted himself among the advocates for the reform, and published some little pieces on the subject at Bologna, under the name of Michael Manfredi. His principal attention, however, was occupied on productions of greater magnitude. He projected a grand work, which was to be divided into three parts, containing a complete system of philosophical, mathematical, and astronomical knowledge. The first of these parts was given by him to the public in 1651, in two large and closely printed volumes, folio, under the title of "*Almagestum Novum, Astronomiam Veterum, Novamque Complectens*," &c. In imitation of the "*Almagest*" of Ptolemy, it presents us with a collection of the discoveries and improvements in astronomical science, from the earliest ages of antiquity to the author's own time. From a table of contents which is prefixed to this part, it appears that the second part was to be divided into five books, treating of trigonometry, or the doctrine of plane and spherical triangles, astronomical instruments, the optical part of astronomy, geography, and chronology; and the third part into ten books, compre-

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hending observations of the sun, of the moon, of eclipses, of the fixed stars, and planets, with precepts, and tables of the primary and secondary motions, and other astronomical tables. But if these parts were completed, they do not appear to have been ever published. In the year 1661 he presented to the world his "Geographiæ et Hydrographiæ Reformatæ, Libri XII." in folio; and in 1665, his "Astronomiæ Reformatæ, Tomi duo," folio, 2 vols. in one. The last work which he published made its appearance in 1669, under the title of "Chronologia Reformata, et ad Certas, Conclusiones Redacta," folio, 2 vols. in one. Father Riccioli died in 1671, when about 73 years of age.

RICCOBONI, LOUIS, a comic actor and writer, born at Modena in 1674, devoted himself to the theatre under the name of Lelio. In 1716 he came to France with his family, and distinguished himself as the best actor at the Theatre Italien. Religious motives induced him to quit the stage in 1729; and he died in 1753, much esteemed for the decency of his manners, and his amiable disposition. He was the author of a number of comedies, which had a temporary success, and which contain much comic humour. One of them, entitled "Les Coquets," was revived a few years since. He also wrote "Pensées sur la Declamation;" "Discours sur la Reformation du Theatre;" "Observations sur la Comedie et sur le Genie de Moliere;" "Reflexions Historiques et Critiques sur les Theatres de l'Europe;" and "Histoire du Theatre Italien."

The "History of the Italian Theatre" of this author, in 2 vols. 8vo., published in 1730 and 1731, and the "Reflections Historical and Critical upon all the Theatres of Europe," which appeared in 1738, contain many judicious observations relative to the stage in general, and, in the work first mentioned, to the lyric theatre in particular.

RICCOBONI, MARIE LABORAS DE MEZIERES, second wife of the preceding, was born at Paris in 1714. After her marriage, she became an actress on the Italian theatre, which she quitted with her husband. She is known by several novels, written with much elegance of style and refinement of sentiment. The principal of these are "Lettres de Miladi Catesby;" "Lettres de la Comtesse de Sancerre;" "Lettres de Sophie de Valiere;" "Ernestine;" "Lettres de Milford Rivers." She also translated Fielding's Amelia; and she appears to have had a predilection for England, in which the scene of several of her novels is laid. She was in habits of intimate correspondence with Garrick. The works of Madame Riccoboni were printed collectively in 10 vols. 12mo. Neufchatel, and 9 vols. 12mo. Paris. They rank among the most elegant and ingenious of the class, and display much knowledge of the tender affections, and great decency joined to vivacity. Several of her novels have been translated into English. She died in 1792, reduced by the troubles of the time to a state approaching to want.

RICE, in *Botany*. See **ORYZA**.

RICE, in *Rural Economy*, the name of a plant cultivated in many parts of the East, in South Carolina, in America, and also in Spain, Italy, and Piedmont. It is a plant that grows to the height of about two feet and a half, with a stalk not unlike that of wheat, but fuller of joints, and with leaves resembling that of the leek. It branches out into several stems, at the top of which the grain grows in clusters, and each of them is terminated with an ear or beard, and inclosed in a yellow rough husk. When stripped of this, they appear to be of an oval shape, of a shining white colour, and almost transparent. It is probably a plant that cannot be cultivated in this climate, as the experiments said to be made by sir Joseph Banks, and detailed as below by a writer in the tenth volume of the Agricultural Magazine,

seem to shew. It is stated, that the dry or mountain rice which he received last year from the Board of Agriculture for trial, had been procured at a considerable expence by sir John Murray, from the neighbourhood of Serinagur, a city in India, situated at the foot of mount Imaus, where snow lies till late in the spring; and where the climate has been supposed to resemble that of England sufficiently to make it probable that the vegetable productions of the one would equally succeed in the other country; he therefore considers it as a duty owing to the patriotic exertions of sir John, to give the Board some account of the result of the trial of it, made at Spring-Grove, near Hounslow, in Middlesex. He adds, that it was not till near the end of May, when the samples, being of six sorts, were delivered out by the Board, and they were sown immediately, on the 21st day of that month, on six small beds in a garden, under the shelter of a paled fence, in a fourth exposure. And the grains were sown very thin, in order that the progress of their vegetation might be better noted: in a very few days they appeared above ground. The season being warm, with a moderate supply of rain, it was seldom necessary to water them; however, when they appeared to flag, which generally happened after three or four dry days had taken place, they were well sprinkled with a watering pot. He says, that in less than a month they had grown several inches high; each sort had acquired an appearance very different from the rest; some were pale green, and had broader blades; some were deeper coloured, and narrower in the blade; and one sort had a brown hue on the whole plant; and the bases of the leaves in this kind were nearly black.

He further states, that during the month of August, they tillowed much more than he has observed any other corn to do; so much so, that although they had been sown very thin, they became a dense, compact bed of plants: the blades in some of the kinds standing as close, or closer to each other, than the thickest sown barley ever does. At the close of the month the blades were from a foot to eighteen inches high; the plants continued to tillow, each root having by this time produced from ten to twenty off-sets, but no symptom of a rising-stem was at all observable. In the middle of September they had still continued to tillow, and the blades to strengthen, so that some of them were at least two feet long. As the frosts of the autumn were now nearly approaching, it became an object of some importance to examine the state in which the plants really were, in order to ascertain the probability of their having produced ears, or possibility of their having ripened corn, if they had been sown a month or two earlier.

The most careful inspection was therefore made by dissection, but no traces could be found of the rudiment of a joint beginning to form itself on the crown of the root, or of the embryo of the glumes of the ear, which in all kinds of corn are first discernible in that part. He says that about this period he was taken ill, and obliged to desist from observing their future progress; but a frost soon after followed, which cut the blade down to the earth, and at once destroyed all hopes of these kinds of rice producing grain in our climate; the quantity of the blade was however so uncommonly great, that it is not impossible, he thinks, it might be advantageous to sow it as food for cattle, for a very large proportion of stock might certainly be maintained upon an acre of it. He concludes by observing, that before the frost sets in, he had ordered a tuft of each kind of the rice to be transplanted into a pot, and placed in a hot-house, in order, if possible, to ascertain the natural period of this grain; whether, like winter corn, it requires eight or nine months to come to perfection, or, like our Lent

corn, arrives at the same period in five or six: but all of these died, notwithstanding great attention was paid to them: some feed, however, which he had given to Mr. Lambert, succeeded better; it was sown in his hot-house in the month of June, where it thrived well, but did not produce ears till near Christmas, a period of seven months, from whence it is probable, the grain would have ripened in less than two months from the time the ear appeared. It is easy to deduce that in the neighbourhood of Serinagur these kinds of rice are either sown as winter corn, or the climate there is far better suited to promote the quick progress of vegetation than our's is. It was, when it produced ears, about three feet and a half high, and some of the stems had five joints, including the radical one: had it been in a more suitable climate, it would certainly have grown taller, for the flowers dropped off without producing seed.

It is however cultivated much in the East, as in China, as well as in the southern parts of America; the method of which is thus described by Mr. Duhamel.

1. To hasten the sprouting of the rice, it is put into baskets, and soaked for some days in a standing water. 2. When their rice-grounds are so soaked with water as to be quite like mud, they are ploughed with a buffalo yoked to a plough very simple in its make, having but one share, one handle, and no wheels. 3. After a gentle rain, they break the clods with a kind of large hurdle, drawn by a large buffalo; the driver sitting upon it to increase the weight. 4. The ground is cleared of all stones, and whatever roots are in it are pulled up by a strong harrow, with great iron teeth. This instrument is drawn by a buffalo, and a man guides it by the help of two handles, like those of a plough, upon which he leans hard. The earth is like mud, and partly covered with water during all this operation. 5. The earth is afterwards smoothed with a harrow, which has several rows of teeth. A man guides this harrow by its two handles, whilst a buffalo draws it; and as fast as its teeth form little channels in the ground, the water runs in and fills them up. 6. When the rice that was laid to soak has sprouted, the seed is known to be good; and it is then sown by hand, very thick, and as equally as possible. Only part of the ground is sown in this manner, to furnish plants for the rest. The day after it has been sown the points of the plants appear above the surface of the water; for the ground is overflowed all this time with just enough water to cover it. And it is added, that when the plants have acquired a little strength, they are sprinkled with lime-water, to destroy the insects, and some of the weeds that would hurt them. For this purpose a small basket is fastened to the end of a long handle, and dipped in the lime-water, which runs through it, and is conveyed over the plants. And the Chinese have a great veneration for the first inventor of this method, which answers to our custom of steeping wheat in lime-water, or manuring land with quick-lime. 7. Towards April, when the plants are grown strong enough to cover the whole field, and look very green and even, the greatest part of them is pulled up by handfuls, all the mud is carefully washed off their roots, and, being held at the same time as even as possible with one another, they are planted in tufts, pretty far asunder, and in a quincunx form, in fields prepared on purpose for them. A serene day is chosen for this operation, which must be performed as quick as possible. This practice of the Chinese is, he thinks, with respect to the common culture of rice, what the new husbandry is with respect to the common culture of wheat. 8. The rice must be watered, which is always done in China by overflowing it. To this end, the rice-grounds are always near a rivulet, pond, or great pool of

water, from which they are separated only by a bank or causeway. If the water was higher than the rice-ground, a trench cut through the causeway would overflow it at once: but as it is generally lower, or on a level with the rice-ground, the necessary quantity is conveyed in pails or buckets, which are worked chiefly by the help of ropes. 9. Though a man cannot step in these rice-grounds without being up to his knees, the Chinese weed them three times in a summer, and that with such care, that they pull up even the roots of every weed. 10. When the rice is ripe, which is known by its turning yellow, like wheat, it is cut down with a sickle, made into sheaves, and carried into a barn, where it is threshed with flails pretty much like ours: the straw is removed with pitch-forks and shovels, and the outer husk of the grain is taken off by beating it with great wooden pestles, or a kind of mallet, after which it is sifted and winnowed: and, lastly, to get off the under husk, the grain is put between two mill-stones, which are worked by a lever fastened to the upper one. But the two most remarkable circumstances of this culture are, 1st, the care which the Chinese take not to let their plants be too close together, lest they should rob one another of their food; and 2dly, their weeding their rice-grounds three times in a summer, which answers the end of the hoeings recommended for the alleys between the beds of other grain, cultivated according to the horse-hoeing husbandry.

This plant is said to have been lately cultivated with success near Dumfries, by Mr. Charters; notwithstanding the want of success in the above trial, as well as by others in Cambridgeshire. And it is not improbable, but that by degrees it may be so naturalized to the climate, as has been the case with many other plants, as to be cultivated without much trouble or difficulty, and thus contribute to the advantage of the country as an article of the grain kind. Rice forms an excellent kind of bread when incorporated with flour, as well as a good food for the feeding of different sorts of animals of the poultry and other kinds.

Rice is much used as food in the Roman Catholic countries in time of Lent. The ordinary preparation is, by first steeping it in water, then boiling it in milk. Some make it into a sort of farina, or flour, by pounding it in a mortar, after having first put it in hot water, and again washed it out in cold.

Among the common kinds of grain, rice is accounted the mildest and most nutritious, and is supposed to be particularly serviceable in dysenteries and diarrheas. It is less viscous than wheat, or of less tenacity, when boiled with water.

The northern nations eat their fowls and other meats with rice and saffron. The Chinese make a wine of rice, which is of an amber colour, and tastes like Spanish wine, and serves them for their common drink. In some parts of Europe they also draw a very strong brandy, or spirit, from rice.

RICE-Balking, in *Agriculture*, a provincial word, applied to a method of ploughing, in which, according to Mr. Marshall, the flag is always turned up towards the unploughed ground, the edge of the coulter passing close to the edge of the flag last turned: whereas, in *slob-furrowing*, the flag is turned towards the ploughed ground, the coulter passing fifteen or sixteen inches from the last ploughed furrow; into which, in this case, the edge of the flag hangs; and, in both cases, a slip of unploughed soil, of a width nearly to that of the flag, is buried.

RICE-Bird, in *Ornithology*. See *EMBERIZA Oryzivora*.

RICE Lake, in *Geography*, a lake of Canada, having a

portage of 11 miles to lake Ontario. It discharges itself by the river Trent, into the head of the bay of Quinté.

RICEBOROUGH, a town of America, in Liberty county, Georgia, where the county courts are held. The county contains 6228 inhabitants.

RICERCARE, Ital. to seek; whence *ricercata*, a research, a flourish, a prelude, an impromptu, a voluntary. See RESEARCH.

RICEYS, LES, in *Geography*, a town of France, in the department of the Aube, and chief place of a canton, in the district of Bar-sur-Seine; 6, 7, and 8 miles S. of Bar-sur-Seine. The place contains 3842, and the canton 7875 inhabitants, on a territory of 167½ kilometres, in 8 communes.

RICH, CAPE, a cape on the west side of Newfoundland, towards the north end, and is the N.E. part of the gulf of St. Lawrence, having the isle of St. John, and some other small isles, to the N. This cape was the boundary of the French privilege of fishing, which extended from hence northward, and round to cape Bonaville.

RICH Inlet, a narrow channel between two small islands near the coast of North Carolina. N. lat. 34° 14'. W. long. 77° 52'.

RICHARD of St. Victor, in *Biography*, a celebrated divine and scripture commentator in the 12th century, was a native of Scotland, who went to pursue his studies at the university of Paris. Here he entered among the canons regular of St. Augustine, at the abbey of St. Victor, and became a pupil of the famous Hugh, who, like him, derived his surname from the same house. Under this master he assiduously studied the several branches of science, as far as they were then known, particularly theological and biblical literature; and he acquired great reputation by his proficiency, as well as the friendship of the most eminent men in that seat of learning. In 1164 he was elected prior of his monastery, where he died, in the year 1173, equally respected for his virtues as for his learned attainments. His critical pieces are very accurate for the time in which he lived. His style, however, is not very elevated; on which account his pious treatises, though abounding in excellent matter, are greatly deficient in weight and energy. His works consist of critical observations and remarks on some of the historical parts of the Old Testament, relating to the tabernacle and the temple of Solomon; allegorical and moral "Commentaries" on several of the Psalms, the Song of Songs, and the Apocalypse; questions on certain difficult passages of St. Paul's epistles, and other parts of the bible; and numerous critical, doctrinal, and practical treatises. The whole have been frequently printed in a collective form; and the best edition is said to be that of Rouen, in 1650, in 2 vols. folio.

RICHARD I., king of England, surnamed *Cœur de Lion*, son of Henry II. by Eleanor Guienne, was born in the year 1157. As second son he was invested in the duchy of Guienne, and county of Poitou. In 1173 he united with his brothers, Henry and Geoffrey, in a rebellion against his father, which was soon quelled, and forgiven by the reigning monarch. Richard was now sent to Poitou to reduce some revolted barons, where he displayed that martial spirit for which he was afterwards celebrated, and on account of which he obtained his surname. Refusing to pay homage for the duchy of Aquitaine to his elder brother Henry, a war broke out between them in France, which their father found great difficulty in terminating. Henry soon after this died, and Richard, being now heir apparent, was required to resign Aquitaine to his youngest brother, John. This he refused, and new wars ensued. In 1189 he joined

Philip Augustus, king of France, against his own father, and did homage to the French king for the possessions which he held on the continent. A war was the consequence of this unnatural junction, in which Henry was harassed and worn out by Richard, while he found himself abandoned by his youngest son John. Henry died in July of the same year, and was succeeded in his throne by the subject of this article. He is said to have visited his father's corpse on the day after his decease, and expressing great remorse for his past behaviour, charged himself with being his murderer. Richard was crowned at Westminster, received into his confidence the faithful servants of the late king, and discountenanced all those who had been abettors in his own rebellion. He set at liberty his mother, queen Eleanor, who had long been in a state of confinement, and endeavoured to conciliate the affection of his brother John by grants of great extent in England and France. Richard, while prince, had taken the cross along with his father; and now he had come to the crown, he was determined to give scope to his martial talents in the East. Having made the requisite preparations, he, in 1190, had an interview with Philip of France, who had also taken the cross, at which, mutual conditions were agreed upon respecting their co-operation in the expedition, and the peace of the kingdoms during their absence. As a prelude to their enterprise, which, according to the opinion of the times, was regarded as extremely pious in its object and motives, Richard and his nobles, who had embarked in the same cause, exercised their zeal in a horrible massacre and pillage of the Jews in several of the principal towns, which was ended by a bonfire of the bonds which the Christians had entered into with this much injured people.

About the middle of the year, the kings of England and France mustered their forces, which amounted to 100,000 men in arms, in the plains of Veselay, on the borders of Burgundy. Richard then proceeded to Marseilles for embarkation, and in September the two monarchs met at Messina, where they spent the winter, in the course of which, dissensions arose that were nearly breaking out into open hostilities, but which ended in a new treaty, in which all differences were for the present adjusted. Richard had long been under engagements to marry Adelais, Philip's sister; but an attachment which he had formed to Berengaria, daughter of Sanchez, king of Navarre, together with some misconduct of the French princess, induced him to break the contract, in which it appears that Philip acquiesced. Eleanor arrived at Messina with Berengaria; but Richard, without waiting to celebrate his nuptials, set sail in April, 1191, with his fleet, which was soon dispersed by a storm. The king sailed into Crete; but three of his ships, with his intended bride, and his sister, the queen of Sicily, on board, were stranded on the coast of Cyprus. The king of that island treated the unfortunate crews and the princesses with great rigour, in revenge for which insult, Richard landed his army in the island, defeated the inhabitants in two battles, and reduced the king to the surrender of himself, his only daughter, and his sovereignty. In this island he consummated his marriage with Berengaria, and then embarked for Palestine.

The siege of Acre, celebrated likewise in modern times, which had been commenced two years before, was still carrying on by the relics of the emperor Frederic's army, with the other Christian adventurers who had at different times joined the banners of the cross, while it was obstinately defended by a numerous Saracen garrison, supported by Saladin at the head of a powerful host in the field. The arrival of the two kings infused new vigour
into

RICHARD.

into the besiegers, and feats of arms were performed under the walls, by Richard and Philip, especially by the former, who far surpassed his rival in military enterprise. The city surrendered in July 1191, and immediately there were two competitors for the titular kingdom of Jerusalem, whose claims were espoused by the rival kings. Philip, however, did not remain long in the East; he returned home, leaving 10,000 men with Richard, who marched from Acre with the intent of reducing the other towns on the sea-coast, while Saladin attended his motions, and gave him frequent assaults, which produced deeds of extraordinary valour on both sides, till at length a general engagement was brought on, in which, after both wings of the Christian army had been defeated, Richard in the centre, by the most heroic exertions of bravery, and consummate military skill, gained a complete victory. This was immediately followed by the possession of Joppa, Ascalon, and other places which Saladin had deserted; and Richard advanced within sight of the holy city; but the greater part of the allies refused to concur in the siege of that capital, and he was obliged reluctantly to return to Ascalon. Here he concluded a truce with Saladin, on the condition that Acre, Joppa, and the other sea-ports of Palestine, should remain in the hands of the Christians, and that they should enjoy full liberty to perform their pilgrimages to Jerusalem.

Richard now prepared to return home, where his presence was absolutely necessary on account of the great disorders into which his kingdom was fallen. Previous to his embarkation, he terminated the contest for the crown of Jerusalem, by concurring in the election of Conrad, and bestowing the conquered kingdom of Cyprus upon the disappointed competitor Lusignan. At this period, Conrad was murdered in the streets of Tyre by two emissaries of the prince of Assassins, commonly called the "old man of the mountain;" and although the deed was clearly traced to this source, Philip was base enough to calumniate Richard as the author of it, in order that he might have an excuse for the designs which he was carrying on against him in Europe.

Richard set sail from Acre in October, 1192. In the course of his voyage he was wrecked near Aquileia: thence he pursued his way through Germany, in the disguise of a pilgrim; but being discovered near Vienna, he was arrested by the orders of Leopold, duke of Austria, and thrown into prison. He was afterwards given up to the emperor Henry VI., who had been offended by him. When intelligence of this event reached England, queen Eleanor wrote repeatedly to the pope, representing to his holiness the scandal and injustice of selling and imprisoning the most illustrious champion of Christendom, whose exertions for the common cause were celebrated throughout Europe and Asia; and claiming, in behalf of the captive king, the protection of the holy see. Her representations were of no avail: Richard was kept in prison, and loaded with irons; which afforded his rival, Philip, full opportunity for invading his dominions. He entered into a treaty with John, who readily took up arms against his brother's government, while Philip was making himself master of great part of Normandy. Richard, in the mean time, supported his misfortunes and indignities with the most undaunted courage. The emperor, to justify his own conduct, produced the royal captive before the diet at Worms, under a charge of several heinous offences; but Richard repelled the accusations with so much spirit and eloquence, that he carried the assembly with him, who loudly exclaimed against his detention. At length he was liberated, on the condition that 150,000 marks should be paid as a ransom. He arrived in

England in March, 1194, to the great joy of his subjects in general.

When Philip was made acquainted with Richard's deliverance, he wrote to John "to take care of himself, the devil being broke loose." The property of John was immediately confiscated, and his castle at Nottingham seized. Richard was recrowned at Westminster, in the presence of William, king of Scotland; and he then began to raise money, that he might take revenge upon his inveterate foe, Philip of France. John threw himself at the feet of his brother, imploring, in the most abject terms, his pardon. "I forgive him," said the hero, "and hope I shall as easily forget his injuries as he will my pardon." In the ensuing war between Richard and Philip, the former gained some advantages; but a truce suspended farther hostilities. A peace was terminated in 1196; but in the following year, the war was renewed, in which much cruelty was exercised on both sides.

England, during this foreign contention, had been the scene of much calamity, partly through disturbances occasioned by the exactions of a needy and rapacious government, and partly by the more grievous calamities of famine and pestilence. A lasting accommodation with France, as preparatory to another expedition to the Holy Land, was in agitation, when the reign and life of Richard were brought to a close through his avarice, which is thus related by Hume.

Vidomar, viscount of Limoges, a vassal of the king's, had found a treasure, of which he sent a part to that prince as a present. Richard, as superior lord, claimed the whole, besieged the viscount in the castle of Chalus, near Limoges, in order to make him comply with his demands. The garrison offered to surrender, but Richard was determined on revenge; and as he was surveying the castle with Marcadée, leader of his Brabançons, he was struck by an arrow, aimed at him by Bertrand de Gourdon. The wound was not considered as mortal: the place was assaulted and taken, and the whole garrison executed, except Gourdon, who had wounded him, and who was reserved for a more savage execution. By the unskilfulness of the surgeon, the wound, which was at first but slight, exhibited the most dangerous symptoms, and the king felt that his end was approaching. He sent for Gourdon, and asked him what had induced him to make an attempt upon his life; to which the man boldly replied, "You killed, with your own hands, my father and my two brothers, and you intended to have hanged myself: I am now in your power, and you may take your revenge, by inflicting upon me the severest torments; but I shall endure them with patience, provided I can think that I have been so happy as to rid the world of such a nuisance." Richard, struck with the magnanimity and reasonableness of the reply, and probably humbled and penitent by the near approach of death, ordered Gourdon to be set at liberty, and a sum of money to be given him; but Marcadée, unknown to the dying king, seized the unhappy man, caused him to be flayed alive, and then hanged. Richard died in the tenth year of his reign, and the forty-second of his age, leaving no issue behind him. The most shining parts of his character are his military talents. He loved glory, and chiefly military glory; and as his conduct in the field was not inferior to his valour, he seems to have possessed every talent necessary for acquiring it. His resentments were high, and his pride unconquerable. He was distinguished by all the good as well as bad qualities incident to an impetuous and vehement spirit: he was open, frank, generous, sincere, and brave; but revengeful, ambitious, haughty, and cruel. His talents were considerable in

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in the cabinet, as well as in the field. He was a passionate lover of poetry: some of his compositions in that line are said to remain; and he bears a rank among the Provençal poets and Troubadours, who were the first of modern Europeans that distinguished themselves by attempts of that nature.

Though the English pleased themselves with the glory which the king's martial genius procured them, his reign was oppressive and arbitrary, by the high taxes which he levied on them, and frequently without consent of the states, or great council. In the ninth year of his reign he levied five shillings on each hyde of land; and because the clergy refused to contribute their share, he put them out of the protection of the law, and ordered the civil courts to give them no sentence for any debts which they might claim. Twice in his reign he ordered all his charters to be sealed anew, and the parties to pay fees for the renewal. He established by law one weight and measure throughout the kingdom, which the mercenary disposition and necessities of his successor engaged him to dispense with for money.

RICHARD II., king of England, son of Edward the black prince, and grandson of Edward III., was born in 1366, and, on the death of his grandfather in 1377, he succeeded to the throne in his eleventh year. The chief authority of the state, at this time, was in the hands of his three uncles, *viz.* John, duke of Lancaster; Edmund, earl of Cambridge, afterwards duke of York; and Thomas of Woodstock, afterwards duke of Gloucester. A council of nine persons was now nominated to conduct the administration of government. The early part of the king's minority passed in wars with France and Scotland; the consequence of which was a formidable insurrection at home, produced by the taxes necessary for the public service. In 1381, the indecent conduct of a collector of the poll-tax at Deptford having provoked one Walter, by trade a tyler, to break his skull with a hammer, a flame was instantly kindled, which spread over Kent, and the neighbouring counties; so that, in a short time, a body of 100,000 men was collected on Blackheath. Their object was not merely to put an end to an arbitrary tax, but to free the country from the personal servitude to which the lower classes were, at that time, in a great measure subjected. On their approach to London, they sent a message to the king, requesting a conference. He met them on the bank of the Thames, but was unable to satisfy their demands. In the rage of disappointment, they burst into London, committed great devastation, and excited universal consternation. At length ample charters of freedom were granted to them, and a general pardon for all past offences. The insurgents now dispersed, but the principal leader, Wat Tyler, at the head of the Kentish men, remained in London, and was unsatisfied with the concessions granted by the monarch. He met the king in Smithfield, whom he addressed with much insolence, and making the most extravagant demands, Walworth, lord mayor of London, drew his sword and felled him to the ground. While the rioters stood astonished with the fall of their leader, the king, with great presence of mind, rode up alone, and exclaiming that he would be their leader, drew them off involuntarily into the neighbouring fields. The monarch would willingly have pardoned the insurgents, and confirmed to them the charters which had been extorted by force; but other insurrections being excited, his advisers caused him to revoke all the charters that had been extorted from him, and to issue commissions for the trial of the rioters, many of whom were executed.

Richard, when he was sixteen years old, espoused Anne, daughter of the late emperor Charles IV.; after this he began

to exercise a very tyrannical spirit, notwithstanding the early promise of his reign, and he took the great seal from Scroop, who had refused to set it to certain extravagant grants of lands made to courtiers. A war with France and Scotland, and the ambitious projects of the duke of Lancaster, disquieted some succeeding years. In 1385 Richard marched with a large army into Scotland, and ravaged the country to Edinburgh and Perth, both which towns he burnt; in the mean time a Scotch army was making a destructive inroad into England. The duke of Lancaster being absent, prosecuting his claim to the crown of Castile, the king's younger uncle, the duke of Gloucester, a man of popular manners and dangerous ambition, became a leader of the opposition to the administration of the king's favourites. By his influence an impeachment was sent up to the lords against the chancellor; and though the king withdrew, with his court, to Eltham, he was intimidated into a dismissal of his minister, who was afterwards stripped of his estates, and committed to custody. The parliament now felt themselves strong enough to proceed to active measures, and they went so far as to divest the king of all his authority, by obliging him to sign a commission, appointing a council of regency, consisting of fourteen persons, to whom the sovereign power was transferred for a year. The king now, in the twenty-first year of his age, was reduced to a state of complete insignificance, but he held frequent consultations with his friends relative to the means of emancipating himself; and in the year 1387, making a progress to the north, he summoned a council of his friends at Nottingham, by which questions were proposed to the judges concerning the legality of the commission which he had been compelled to sign. They unanimously declared it to be a violation of the royal prerogative, and pronounced all who had joined in the execution of it, as guilty of a capital offence. The duke of Gloucester and his party began now to make preparations to maintain their cause by force of arms. Being by much the stronger party, they obliged the king to accept of terms, and at the ensuing meeting of parliament the five principals in the king's council were impeached, and condemned to death. The judges, who had given their opinion in favour of the king, were all found guilty of high-treason, but the punishment of death was commuted for imprisonment in Ireland during life. In 1389 Richard entered the council, and, in a resolute tone, observed, that he was of full age to take the government into his own hands: his enemies submitted, and he granted a general amnesty.

Several years of tranquillity ensued, and the return of the duke of Lancaster formed a counterbalance to the influence of the duke of Gloucester. In 1394 Richard visited Ireland at the head of an army, in order to settle the affairs of that island, which he accomplished, and then returned. Although no acts of notorious misgovernment had been committed by the king for a considerable period, yet his private character and mode of life tended to disgrace him in the eyes of his subjects. He was indolent and averse from business, and spent all his time in conviviality and amusement, admitting jesters and persons of the meanest rank and station to his intimacy, and laying aside all the proper dignity of rank. He was still governed by favourites, who were the real distributors of every grace from the crown, so that the king was little better than a cypher. By Gloucester and his party the most criminal designs were imputed to Richard, which led the king, by the advice and sollicitation of his adherents, to apprehend the duke and his two accomplices, the earls of Arundel and Warwick. This plan was executed in 1397; the duke was sent over to Calais in close custody, while the earls were committed to prison. A parliament

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was then assembled, before which the culprits were impeached of high treason. Lord Arundel was condemned, and executed; the earl of Warwick was also convicted, and condemned to perpetual banishment. The duke of Gloucester was said to have died of an apoplexy, but it was soon discovered that he had been suffocated. Although the proceedings of parliament were favourable to the royal authority, yet much ill-will prevailed in the nation on account of its severities, and troubles were continually breaking out among the nobles. A quarrel between the dukes of Hereford and Norfolk, arising from a charge brought by the former against the latter, of slanderous words spoken concerning the king, was the cause of the revolution that terminated the reign. Richard interposed his authority and banished them both; but it was agreed, that both exiles might receive, by their attorneys, any inheritance that should fall to them during their absence. In 1399, John of Gaunt, duke of Lancaster, died, and his son, the duke of Hereford, became heir to his vast estates, which Richard, in defiance of the agreement, seized as property lapsed to the crown, and the attorney who claimed them for the duke was even condemned as a traitor. While the nation was full of discontent on account of this act of tyranny, Richard went to Ireland, and, during his absence, Henry of Bolingbroke, as the duke of Hereford, invited by his numerous partisans to make use of this opportunity, came over from France, and landed in Yorkshire, and being joined by the earls of Northumberland and Westmoreland, and other men of rank, proceeded towards the south, at the head of 60,000 men, pretending that their sole intention was to recover the duchy of Lancaster. The duke of York, who had been left regent of the kingdom, joined Henry; and Richard, having heard these facts, intended to withdraw into France. He was, however, taken and thrown into Flint castle, from whence he was taken to London. His deposition being resolved on, thirty-five articles of accusation were drawn up against him, which, however informal, and many of them unjust, were considered as quite sufficient to justify the measures taken against him, and Richard was deposed Sept. 30, 1399. Henry at the same instant stood forth, and claimed the crown, which was without hesitation awarded to him. He declared that the life of the dethroned king should be safe, and he was committed for safe custody to the castle of Pomfret; but the usual fate of deposed monarchs soon awaited him. Indeed it was easy to foresee that he would not long remain alive in the hands of such barbarous and sanguinary enemies. Historians differ with regard to the manner in which he was murdered. It was long the prevailing opinion, that sir Piers Exton, and others of his guards, fell upon him in the castle of Pomfret, where he was confined, and dispatched him with their halberds. But it is more probable, that he was starved to death in prison; and after all sustenance was denied him, he prolonged his unhappy life, it is said, for a fortnight, before he reached the end of his miseries. This account is more consistent with the story, that his body was exposed in public, and that no marks of violence were observed upon it. He died in the thirty-fourth year of his age, and the twenty-third of his reign. He left no posterity, either legitimate or illegitimate.

All the writers who have transmitted to us the history of Richard, lived during the reigns of the Lancastrian princes; and candour requires, that we should not give entire credit to the reproaches which they have thrown upon his memory. But, after making all proper allowances, he still appears to have been a weak prince, and unfit for government, less for want of natural parts and capacity, than of solid judgment

and good education. He was violent in his temper; profuse in his expence; fond of idle show and magnificence; devoted to favourites, and addicted to pleasure; passions, all of them, the most inconsistent with a prudent economy, and consequently dangerous in a limited and mixed government.

This prince lived in a more magnificent manner than perhaps any of his predecessors or successors. His household consisted of 10,000 persons. He had 300 in his kitchen, and all the other offices were furnished in proportion. It must be remarked, that this enormous train had tables supplied them at the king's expence, according to the mode of that age. Such prodigality was probably the source of many exactions by purveyors, and was one chief reason of the public discontents.

RICHARD III., king of England, born in 1450, was the youngest son of Richard, duke of York. On the accession of his brother, Edward IV., he was created duke of Gloucester, and during the vicissitudes in the early part of Edward's reign, he adhered most closely to him, and served him with courage and fidelity. He is said to have had a hand in the slaughter of Edward, prince of Wales, after the battle of Tewkesbury, and to have been the author, if not the real perpetrator, of the murder of Henry VI. in the Tower, but the ferocity of his disposition was in him united with deep policy and dissimulation. He married, about the year 1473, Anne, the widow of the prince of Wales, already mentioned, who was daughter of Neville, the great earl of Warwick. His elder brother, Clarence, had married the other daughter, and a violent dissension took place between them, on account of the division of the property. Richard, who found Clarence an obstacle to his views of aggrandizement, combined with the adversaries of that unfortunate prince in accusations which proved his destruction. On the death of Edward (see his article) in 1483, the duke of Gloucester was appointed the protector of the kingdom. He immediately caused his nephew, the young Edward V., to be proclaimed king, and took an oath of fealty to him. There were at this time two great factions in the nation, of which the leaders were the duke of Buckingham and lord Hastings. Both these courted the duke of Gloucester, who pretended a steady friendship for each when apart, while he was pursuing schemes of the blackest ambition. His first object was to get rid of those who were connected with the young king by blood; and after spending an evening in company with Rivers, Grey, and sir Thomas Vaughan, he caused them to be arrested the next morning, and committed to Pomfret castle, at the same time dismissing all the king's attendants and servants. He shortly after caused the prisoners at Pomfret to be put to death without the form of trial; and on the very day of their execution, at a council held in the Tower, a cry of treason was raised by his order, on which a party of armed men entered, who seized the archbishop of York, the bishop of Ely, lord Stanley, and lord Hastings, of whom the three first were committed to custody, while Hastings was led to immediate death. After this, his next step was to establish, with or without evidence, the illegitimacy of Edward's children, to make way for himself on the throne. This he did by attacking the chastity of his own mother, who, he said, had been true to her husband only in the case of himself, and that to Edward and Clarence there were different fathers. These pleas were zealously advocated by his adherents, and among others by Dr. Shaw, brother to the lord mayor of London, who dwelt upon them with much eloquence, in a sermon which he preached at St. Paul's Cross. The duke of Buckingham afterwards, in a speech

speech before the corporation and citizens of London, enlarged upon the title and virtues of the protector, and then put the question to his audience, whether they chose the duke of Gloucester for king? On their silence, he repeated the question with more importunity, and at length a few voices cried out "God save king Richard." This was construed into a public declaration in his favour, and Buckingham, with the lord mayor, repaired to the protector with a tender of the crown. He first affected alarm and suspicion, and then pretended loyalty to his nephew, and unwillingness to take such a burden upon himself. At length he accepted the offer, and Richard was proclaimed king on the 27th of June 1483. The deposed king and his brother were never more heard of, they were probably murdered in the Tower.

Richard was now extremely liberal towards those who had been instrumental in the change, and took other methods to court popularity. He made a progress with a splendid retinue through several of the towns, and at York was a second time crowned, on which occasion he created his only son prince of Wales. He soon began to display all the qualities of a most cruel tyrant, which so disgusted the whole nation, that designs were formed to hurl him from the throne. A conspiracy was excited against him, in favour of Henry, earl of Richmond, which he discovered and quelled. This failure appeared to seat the king more firmly on the throne, and he took advantage of his situation by calling a parliament, in which many good laws were passed, the progeny of Edward IV. were bastardized, and the crown settled on himself and posterity. The death of his son, soon after, was a severe stroke to him in the midst of his prosperity, which was followed by that of his wife; the last was imputed, but without any evidence, to the effects of poison. To prevent a projected marriage between Elizabeth, the eldest daughter of his brother Edward, and the earl of Richmond, Richard determined to marry her himself; as this union would have been very detrimental to the earl's interest, he hastened his preparations for another expedition to England, and in August, 1485, landed an army at Milford-haven. Richard, informed of the advance of his rival, took the field, and met him, with an army of nearly 15,000 men, at Bosworth, in Leicestershire. The battle was fought on the 23d of August; in which the king, finding his situation desperate, rushed against his competitor, slew his standard-bearer, and was upon the point of encountering the earl himself, when he was himself slain. The body of Richard was found in the field, stripped naked, and carried across a horse to Leicester, where he was interred in the Grey friars' church-yard. Thus fell this hated tyrant, after having possessed the throne about two years and two months. The historians, says Hume, who favour Richard, maintain, that he was well qualified for government, had he legally obtained it; and that he committed no crimes but such as were necessary to procure him possession of the crown: but this is a poor apology, when it is confessed, that he was ready to commit the most horrid crimes that appeared to him necessary for that purpose; and it is certain, that all his courage and capacity, qualities in which he really seems not to have been deficient, would never have made compensation to the people for the danger of the precedent, and for the contagious example of vice and murder, exalted upon the throne. In person, Richard has been represented as of small stature, deformed, and of a forbidding aspect, but it is probable that the detestation of his character has aggravated his bodily defects. His memory lives in popular tradition, as that of the most odious tyrant that ever filled the English throne. For the foregoing

articles we are chiefly indebted to the histories of Hume and Henry.

RICHARD, JOHN, a French advocate and theological writer in the 17th and the early part of the 18th centuries, was born at Verdun, in Lorraine, about the year 1638. The first part of his education he received at Pont-a-Mousson, and was then sent to Paris, where he studied law and divinity. Afterwards he was admitted an advocate at Orleans; but more for the sake of possessing the rank and privileges connected with that title, than from any design to practise at the bar. His inclination led him to devote his time and talents to the composition and publishing of sermons. By his numerous productions of this description he acquired celebrity. In the year 1700 he began to publish a compilation, under the title of "A Moral Dictionary, or, Universal Pulpit-Science," which, in 1715, was extended to 6 vols. 8vo. It consists of striking sentiments and reasonings on a great variety of subjects, selected from the works of French, Spanish, Italian, German, and other divines, arranged in alphabetical order.

RICHARDIA, in *Botany*, was named by Housfoun, in honour of Richard Richardson, M.D. F.R.S. who resided on his own estate at North Bierly, Yorkshire, and died at an advanced age, about the year 1740. His fortune rendering him independent of medical practice, as a maintenance, he bestowed great attention on the botany of his own country, and his name occurs continually in the publications of the early part of the 18th century, as the correspondent of Ray, Sloane, Dillenius, &c. He communicated several papers, on various subjects, to the Royal Society; none of them botanical; see Pulteney's Sketches, v. 2. 185.—Linn. Gen. 174. Schreb. 230. Willd. Sp. Pl. v. 2. 222. Mart. Mill. Dict. v. 4. Juss. 198. Lamarck Illustr. t. 254. Gærtner. t. 25. (Ricardia; Rel. Housf. 5. t. 9.)—Class and order, *Hexandria Monogynia*. Nat. Ord. *Stellatae*, Linn. *Rubiaceae*, Juss.

Gen. Ch. *Cal.* Perianth superior, of one leaf, in six deep, erect, pointed segments, half the length of the corolla. *Cor.* of one petal, funnel-shaped; limb in six acute, erect segments. *Stam.* Filaments six, very short, inserted into the tube of the corolla, alternate with its segments; anthers small, roundish, between the segments. *Pist.* Germen inferior, three-lobed; style thread-shaped, the length of the stamens, three-cleft in the upper part; stigmas obtuse. *Peric.* none. *Seeds* three, obovate, gibbous, rounded at the outer side, angular at the inner, crowned with the calyx.

Obf. Gærtner has observed that the calyx and corolla have sometimes eight segments, with eight stamens.

Ess. Ch. Calyx in six segments. Corolla of one petal, funnel-shaped. Seeds three, crowned with the calyx.

1. *R. scabra*. Linn. Sp. Pl. 470. Willd. n. 1.—Gathered by Housfoun at Vera Cruz.—A rough hairy plant, with the habit of a *Spermacoce*. The stem is tall, purplish, with opposite branches, its hairs curved downwards. *Leaves* opposite, crowded, ovate, pointed, entire, hairy, with many straight, parallel ribs. *Flowers* encompassed with numerous hairy bristles. *Calyx* bristly.

RICHARDSON, JONATHAN, in *Biography*, a painter, and a writer on the art of painting, was born about the year 1665. He was intended by his father for the law, but at twenty years of age was permitted to desert that profession, and follow the bent of his inclination for painting. He then became the disciple of Riley, with whom he lived four years, and finally connected himself by marrying his niece. The degree of skill which he attained, by no means

corresponded with the ideas he entertained of the art, which were certainly of a just and elevated kind. There are, however, great strength, roundness, and boldness in the colouring of his heads, which are drawn and marked in the manner of Kneller, with freedom and firmness; though the attitudes in which they and his figures are placed, the draperies which clothe the latter, and the back-grounds from which they are relieved, are insipid and tasteless. It is certainly a very curious circumstance, that, when he wrote with so much fire and judgment, as is displayed in his *Essay on Criticism*, and the *Science of a Connoisseur*, dived so deep into the inexhaustible stores of Raphael, and was so smitten with the native lustre of Vandyke, he should so ill apply to his own practice, the sagacious rules and hints he gave to others. Full of theory, profound in reflections on the art, and possessed of a numerous and excellent collection of drawings, he appears to have possessed no portion of invention, as applicable to the painter's art, and drew nothing well below the head; plainly manifesting the peculiarity of taste or feeling which leads to excellence in that profession.

Thus much, however, must be said of him, that when Kneller and Dahl were dead, he stood at the head of the portrait painters in this country, and practised in it sufficiently long to acquire a tolerable competency. He quitted his occupation some years before his death, when Hudson, who had married one of his daughters, maintained the family honours for a while. Richardson himself, by temperance and tranquillity of mind, enjoyed a life, protracted amidst the blessings of domestic friendship, to the advanced age of eighty, and then died respected and lamented. He had had, a short time previously, a paralytic stroke that affected his arm, yet never disabled him from taking his customary walks and exercise; and it was after having been in St. James's park, he departed suddenly, at his house in Queen-square, on his return home.

The sale of his collection of drawings, in February 1747, lasted eighteen days, and produced 2060*l.*; his pictures about 700*l.* He left a son, who painted and drew also, and who appears to have been a perfect pattern of filial reverence and affection.

RICHARDSON, SAMUEL, in *Biography*, was born in 1689, in some part of Derbyshire, to which county his father had retired from business, which he had carried on in London. In very early life he was characterized for his love of reading, and while a mere boy, he displayed the uncommon qualities of a taste for letter-writing and female society. At the age of thirteen, he was so much in the confidence of three young women, as to be employed by them in making draughts of letters to their lovers; and, at this early period, such were his fidelity and discretion, that not one of them suspected him to be the writer for the others. He was apprenticed to a printer, whom he served most conscientiously for the full term of seven years, stealing from the hours allowed to rest and recreation, his opportunities for mental improvement. After the expiration of his apprenticeship, he passed several years as journeyman in a printing-office, and then set up in business for himself. His habits of diligence and accuracy, and his honourable dealings, soon gained him employers and friends, and he was often applied to by book-fellers for making indexes, and writing prefaces and dedications. The immediate occasion of his becoming a novel-writer, was an application made to him by two book-fellers, to write for them a volume of letters in a common style, on subjects that might serve as models for the use of those who had not the talent of inditing for themselves. He extended the idea to the conveying of instruction in thinking and

acting upon important occasions; and in composing some letters for the salutary purpose of teaching young women going out to service how to avoid the snares that might be laid for their chastity, a story which he had heard many years before of a real occurrence came into his mind, and became the parent of "Pamela." This work was published in 1740, and was received with extraordinary applause by readers of all ranks. It brought the author into immediate notice; but his "Clarissa," of which the first two volumes appeared in 1748, placed him in the first rank of novelists. "A tale so varied by character, so minutely developing the movements of the human heart, so pathetic in its circumstances, and presenting so sublime and perfect an image of female purity, had never before been given to the public. The interest it excited during its progressive appearance, especially among female readers, was incredible, and the fate of no real personage could have agitated more bosoms than that of the fictitious heroine." Rousseau, in speaking of it, asserts, that "nothing was ever written equal or approaching to it in any language." The "History of Sir Charles Grandison," his concluding work, appeared in 1753, which was intended to give the world an example of a perfect man, uniting the fine gentleman and the Christian.

While he was advancing in the career of his literary fame, he was not inattentive to that improvement of his fortune which his assiduity and integrity in his profession so well merited. His first great public employment was that of printing the "Journals of the House of Commons," in 26 vols. folio, which he obtained through the recommendation of his friend, Mr. Speaker Onslow. In 1754 he rose to be master of the Stationers' company, and in 1760 he purchased a half of the patent of law-printer to his majesty. He was twice married, and had several children, but four daughters only grew up to solace his declining years. He was the substantial valuable friend in difficulty, distress, and sickness. He was most exemplary in temperance both of body and mind, and in the faithful discharge of every moral duty. He died at the age of seventy-two, and was interred by the side of his first wife in St. Bride's church. The writings of Richardson, exclusive of the three novels above referred to, were of no great consequence. They are chiefly the "Familiar Letters" already noticed; an edition of "Æsop's Fables," with reflections. His "Correspondence," selected from the original manuscripts, was published in six volumes, in the year 1804, with a biographical account of the author, by Mrs. Barbauld, to which the reader is referred for more particulars relating to Mr. Richardson.

RICHARDSON'S Bay, in *Geography*, a bay on the S.E. coast of Jamaica.

RICHAW, a town of Prussia, in the province of Oberland; seven miles S. of Liebitat.

RICHBOROUGH, a hamlet, and a district of land, in the parish of Ash, lower half hundred of Wingham, lathe of St. Augustine, and county of Kent, England, is situated about two miles N.W. from the town of Sandwich. It is noted in history as the site of the Roman post which guarded the southern entrance of the Portus Rutupensis, whence it derived its original name of Rutupium. The fortrefs which defended the northern entrance was called Regulbrum; and is noticed under the article RECVLVER. This port, in Roman times, appears to have been the most famous of any in Britain; for it is noticed in the writings of Lucan, Juvenal, and Ausonius; and also in those of Tacitus, Ammianus Marcellinus, and Orosius. It likewise occurs in the *Geography of Ptolemy*, in the Itinerary

of Antoninus, in the Index of the writer of Ravenna, in the Peutingerian Tables, and in the Notitia of the western empire. In those days the site of Rutupium was a small island, though at present it is a considerable distance within land. This is proved by the testimony of many ancient writers; by the appearance of the surrounding country; and the fact of strata of sea-sand being discovered by digging into its surface. The period when it was deserted by the ocean was probably between the fourth and sixth centuries, as about that time the name of Sandwich, which rose on the ruins of the Rutupian haven, begins to be mentioned in ancient writings as a frequented port.

Richborough was anciently called *Rhutupia*, *Portus Rutulenſis*, or rather *Portus Rhutupenſis*, *Rhutupſis Portus*, *Rhutupia Statio*, and *Rhutubi civitas et portus*, among the Greek and Roman writers, by the Saxons denominated *Reptaceſter*, and by others *Ruſtimouth* and *Richberg*. After the Saxons had commenced their piracies on the coast, the legio ſecunda Auguſta, which had been brought from Germany by Claudius, and had been for many years ſtationed at Iſca Silurum, in Wales, was removed hither and commanded by an officer under the count of the Saxon ſhore. Under the Saxons it was ſtill conſiderable, and the place in which king Ethelbert reſided.

Much diversity of opinion prevails among the learned as to the precise situation of the Urbs Rutupia, some identifying it with the castle, and others placing it along the adjacent shore, while a third class of writers fix it at Canterbury. Among those who espouse the last opinion is the late bishop Douglas, who has discussed the subject with great learning and ingenuity, in a paper printed in the first volume of the "Bibliotheca Topographica Britannica." With his view of the matter, indeed, we are strongly inclined to coincide; for it seems impossible that the city could stand within the narrow limits of the castle, and there are no vestiges in its vicinity of foundations of extensive buildings, a circumstance which could scarcely have happened, if such buildings had ever existed. Of the fortress itself, however, much yet remains to solicit the examination and excite the amazement of the antiquary. In form it appears to have been, when complete, a regular parallelogram; but the greater part of the eastern wall is now destroyed. The whole site exterior to the ramparts occupied six acres, one rood, and eight perches of ground; and the area within the walls five acres, three roods, and eight perches. The walls were flanked by round projecting towers at the angles, and by square ones at irregular distances along the sides. There are marks of two of these in the west wall, and of two others, besides the Porta-Decumana, in the north wall, and of two more in the south wall; in which undoubtedly was a third, that has fallen down the bank. These square towers, projecting about eight feet from the wall, were solid nearly eight feet from the foundation, above which they were hollow. In the main wall within these towers are four large, round, smooth holes in a row, each about nine inches in diameter, and penetrating about eight feet into the substance of the main wall. Below these are smaller holes, four inches in diameter, that run about ten inches into the wall; all which seem to have served for the insertion of beams, to support an apparatus of defensive machinery. Within the area, towards the north-east corner, and beneath the surface of the ground, is a solid rectangular platform of masonry 144 feet long, 104 feet wide, and 5 feet thick. It is composed of boulders and coarse mortar; and is covered on the upper side with a coat of the same sort of mortar to the depth of six feet. In the centre of the platform is the base or foundation of a building

in the shape of a cross, which rises about five feet above the level of the platform. The shaft of this cross measures 87 feet in length and $7\frac{1}{2}$ feet in breadth; and its transverse is 46 long and 22 wide. In the western wall of the castle was a large opening, 34 feet wide, where, about five feet under the surface, is part of another platform, consisting of large square blocks of stone, and measuring 24 feet 11 inches in breadth. There is no appearance of any superstructure having been raised from this foundation. Near the middle of the north wall is the oblique entrance, or "Porta-Decumana," which is narrow; and, from the holes remaining in the walls, seems to have been furnished with good timber defences. The exterior passage, running parallel with the main wall, is about four feet and a half wide, having a channel at the bottom for carrying off water from the higher ground within the castle. Many Roman coins and other antiquities have been discovered as well within the area of the fortress, as in its vicinity; and at the distance of about 460 yards from its south-western angle, the remains of a Roman amphitheatre are yet distinctly visible, though its banks are much mutilated and levelled by the operations of husbandry. Leland informs us, in his Itinerary, that there was formerly "a lytle parochie church of St. Augutline and an hermitage" within the castle. The church was a chapel of ease to that of Ash; and is mentioned as standing in the reign of Edward VI. Antiquities of Richborough and Reculver, abridged from the Latin of archdeacon Battely, Lond. 8vo. 1774. Bibliotheca Topographica Britannica, vol. i. 4to. Lond. 1780. Beauties of England, &c. vol. viii. by E. W. Brayley. King's Munimenta Antiqua, vol. iii.

RICHEA, in *Botany*, so named by Mr. R. Brown, in memory of M. Riche, one of the naturalists who accompanied the expedition in search of La Perouse, and being in a confirmed consumption at setting out, died in the course of the voyage. Labillardiere has dedicated a genus to this companion of his labours, but it proves no other than what Forster had previously published as *CRASPEDIA*; see that article. Brown Prodr. Nov. Holl. v. 1. 555. — Class and order, *Pentandria Monogynia*. Nat. Ord. *Eparcridea*, Brown.

Eff. Ch. Calyx membranous, simple, in five deep segments. Corolla of one petal, closed, hood-like, splitting transversely; its abrupt base remaining. Stamens inserted into the receptacle, permanent. Five scales under the germen. Capsule superior, of five cells. Receptacles separate, pendulous from the top of the central column.

1. *R. dracophylla*.—Gathered by Mr. Brown, in Van Diemen's island. A *ſhrub*, varying remarkably in stature, being only eighteen inches high on the summits of the mountains, but in woods at their sides becoming a small *tree*, of the height of ten feet. "It has altogether the habit of Labillardiere's *Dracophyllum montanum*, differing only in the singular economy of the *corolla*, which however seems sufficient to mark it for a distinct genus." Brown. Notwithstanding the opinion of this judicious author, we presume to think his *Cyſſanthe*, Prodr. Nov. Holl. v. 1. 555, scarcely sufficiently distinguished from the above. Their *corollas* and *capsules* agree; the only difference consisting in the foliaceous *calyx* of *Cyſſanthe*, and its want of scales below the *germen*. We feel the more disposed to unite these genera, as there is but one known species of either.

RICHEFORT, or RICCIAFORT, JOHN, in *Biography*, a Netherlandish musical composer of considerable eminence. He is placed by Walther in the middle of the sixteenth century; but he was certainly a composer many years before

fore that period, as we find his name not only in the second book of "Motetti della Corona," published at Foffembrone, 1519, and preserved in the British Museum, in which collection he was author of the fourth motet, "Miseremini mei;" but to a motet in a music-book, preserved at Cambridge, of Henry VIII. when prince of Wales. Glareanus says, that "great praise is due in our times to the vocal compositions of John Richefort." In the museum collection of French songs, in four, five, and six parts, printed in the Netherlands during the sixteenth century, there is one by this author for three tenors and a base, which, though it would be thought monotonous by modern ears, has great merit for the artful contexture of the parts, which are moving throughout in close fugue and imitation. The words, indeed, of these old songs are generally as rude and devoid of meaning as those of our own country, equally ancient; this, however, contains a general censure of indiscriminate urbanity.

RICHELET, CÆSAR-PETER, a French writer, was born, in 1631, at Cheminon, in Champagne. He went, when young, to Dijon, where he superintended the education of the son of the marquis de Courtivron. About 1660 he went to Paris, was admitted an advocate, and began to plead at the bar. He became connected with d'Ablancourt and Patru, and acquired reputation from the attention he paid to the French language. In 1665 he was admitted to an academy of men of letters, which the abbé d'Aubignac had established at his own house. It appears that he was for some time placed about the dauphin, as one who might contribute to inspire that prince with the love of literature. He afterwards took up his abode in different parts of France, the enemies he made by his satirical disposition obliging him frequently to shift his residence. He died at Paris in 1698, at the age of 67. The principal work of Richelet is his "Dictionnaire François," of which the first edition was published at Geneva in 1680, 4to., and several have since been printed with additions. The last is that of the abbé Goujet, Lyons, 1759, 3 vols. fol. Richelet's Dictionary has been popular, though his orthography was much censured. He also published "Dictionnaire des Rimes;" "Les plus Belles-Lettres des meilleurs Auteurs François;" of this collection the best edition is that of Bruzen de la Martiniere, 1737, 2 vols. 12mo.; "A Translation of Garcilasso de la Vega's History of Florida;" and other works.

RICHELIEU, ARMAND DU PLESSIS, a famous prime minister of France, born at Paris in 1585, was the son of Francis du Plessis Richelieu, grand provost of France, and captain of the guards to Henry IV. He was brought up to the church, and after studying at the Sorbonne, went to Rome. At the early age of 22, he was consecrated bishop of Luçon. Though he had obtained some distinction by his proficiency in scholastic theology, his great object was to make his way at court. He concealed, under polite and insinuating manners, a determined disposition, and a spirit of intrigue well suited to a female regency and a reign of favourites. The queen-mother, Mary of Medicis, in 1616 nominated him her grand almoner and secretary of state. On the fall of the marshal d'Ancre, his protector, Richelieu retired from court, and affected to employ himself in writing books of devotion, while he was upon the watch to recover his credit. This point he at length gained, by effecting an accommodation between the queen and her son Lewis XIII., and the new favourite de Luignes rewarded his services by procuring him a cardinal's hat in 1622. After the death of Luignes, the court and kingdom fell into disorder through the intrigues of the great, and the con-

tentions of different parties, while all agreed in their defiance of the laws, and encroachments upon the supreme authority. A minister of equal talents and resolution was wanted to remedy these evils, and he existed in Richelieu. He had gained the confidence of the queen-mother, who recovered influence enough to introduce him into the council, notwithstanding the opposition of the other ministers, who feared him, and the repugnance of the king, who suspected his ambition, and was shocked with his licentious manners. In 1624 he found means to subvert all his rivals, and to possess himself of the whole authority of the crown.

The government, in his hands, soon assumed a tone of vigour and decision. He concluded the treaty of marriage between the prince of Wales and Henrietta, the French king's sister, in spite of the efforts of Rome and Spain, and equally disconcerted those courts by sending an army, and preventing the projected union with the Milanese. He next turned his arms against the French Calvinists, who, rendered disaffected by the frequent breaches of the treaties made with them, were become a kind of independent republic within the kingdom. Having first secured the friendship of Holland by pecuniary aid, he obtained the assistance of its fleet, and that of the English, against their brother Protestants of Rochelle, and expelled them from the isle of Rhé. It is acknowledged that the French monarchy dates from him its strength and independence. One of the principal enemies he had to contend with was Gaston, duke of Orleans, the king's brother. In consequence of a conspiracy entered into by this prince to assassinate the minister, and effect great changes at court, Richelieu arrested several of his confidants, and brought some of them to the scaffold. The danger he had incurred formed a pretext for giving him a body guard; and, by his pretended wishes to quit his station, he augmented his influence over his master. In 1627 war broke out with England, chiefly in consequence of the insolent vanity of the duke of Buckingham; and the Rochellers, with whom an accommodation had been made, were induced to favour the English. Richelieu thereupon resolved to reduce to submission a town which had long been the seat of an independent power, often leagued with the enemies of the kingdom; and after the duke of Buckingham had been obliged with disgrace to quit the isle of Rhé, Rochelle was invested on all sides. Richelieu in person took the command of the siege, and in order to prevent the arrival of succours by sea, he caused to be constructed a vast dyke in the ocean, by which all communication from abroad was cut off. This circumstance has given occasion to the cardinal's flatterers to compare him with Alexander before Tyre, and the work has been represented as one of the prodigies of his genius; but it was really that of the genius of the engineer Metezeau, and Richelieu only deserves the praise of adopting a bold design, and finding resources for putting it in execution. At length, after a noble resistance of eleven months, Rochelle submitted to famine; and the Protestants having lost their great bulwark, and all their other strong places, were rendered incapable of again acting as an armed party. It is to the credit of the policy and moderation of Richelieu that they were still allowed the free exercise of their religion.

In 1629 Richelieu received the patent of prime minister, and was nominated lieutenant-general of the army employed in the war in Italy, with powers so extensive, that the royal authority was reduced to a shadow. All that was great in the nation trembled before him. His foreign politics had chiefly in view the humiliation of the house of Austria; and by his treaty, in 1631, with Gustavus Adolphus, he enabled that great king to pursue those plans which brought

the empire to the brink of ruin. Gaston, duke of Orleans, in his retreat, with the duke of Lorraine, whose sister he had married for his second wife, plotted to excite a civil war for the expulsion of Richelieu, and his own return to consequence. His intrigues were discovered, and all his partizans were declared guilty of treason. The duke of Lorraine was compelled to abandon him, and incurred the loss of some of his strongest places. Gaston entered France with a small body of troops, accompanied by the brave duke of Montmorenci, but was defeated at Castelnaudari. Montmorenci was taken prisoner, and expiated his crime on the scaffold. The queen-mother herself was put under arrest, her servants were all sent to the Bastille, and she finally ended her days in exile at Cologne. The king supported his minister in all these severities, created him a duke and peer, and gave him the government of Brittany.

France had hitherto acted only as an ally to the Swedes in their hostilities against the house of Austria; but after their defeat at Norlingen in 1634, the cardinal thought it necessary to enter as a principal into the war; and forming an alliance with Holland, and the dukes of Savoy and Parma, he caused war to be declared against the king of Spain in 1635. Events were at first unfavourable to the French arms, but at length became more prosperous to France, and the enemy was driven from her territories; the public finances were, however, exhausted, and recourse was had to the creation of a great number of venal offices, and other objectionable measures, to raise the necessary supplies. The talents of a financier do not seem to have been among Richelieu's qualifications, and he himself gave an example of profusion which increased the public discontent. No prime minister ever affected more state and splendour. The daily expence of his household was estimated at a thousand crowns, a prodigious sum at that period! His guards and attendants, his equipage and establishment, were rather upon the scale of a sovereign prince than of a subject, and he much surpassed his master in external pomp. Lewis betrayed a dissatisfaction on this account, which probably induced Richelieu to make him a present of his palace, since called the Palais Royal. He incurred great personal danger in 1642, from a conspiracy against his power and life, headed by Cingmars. (See his article.) The duke of Bouillon, and the duke of Orleans, entered into the plot, and negotiations were opened with Spain for assistance. The good fortune of Richelieu produced a timely discovery of this treason, and Cingmars was beheaded. The duke of Bouillon was arrested, but made his peace by resigning his principality of Sedan. Gaston furnished proofs against his associates. The victim most worthy of compassion on this occasion was the son of the illustrious de Thou, who was capitally condemned only for not revealing a conspiracy which he disapproved. Richelieu was at this time lying dangerously sick at Tarascon. He proceeded to Lyons by water, and was thence carried to Paris in a kind of chamber, borne on the shoulders of his guards, breaches being made in the walls of the towns through which he passed to admit him. It soon appeared that he had not long to live, and he prepared for the final change with great firmness. In receiving the sacrament he declared, that in the course of his ministry, he had never any thing in view but the good of religion and the state—a declaration which the public opinion did not ratify. He died in December 1642, at the age of 58, worn out with toil and anxiety; but he terminated his career with fortitude and serenity, that astonished those who had beheld the sanguinary effects of his administration. Three mighty and successful projects immortalize the period of his government. He humbled the turbulent spirits of the great, he subdued the stubborn zeal of the Hugonots,

and he curbed the encroaching power of the house of Austria. Unshaken and implacable, prudent and active, no combinations of the powerful nobles could withstand his vengeance; no intrigues could elude his penetration; while he exalted the throne, he controlled a sovereign impatient to rule, and jealous of his authority; and while he extinguished the liberties of the people, he established among them discipline and order, and opened to them the paths to learning and renown. His own account of his public character is this: "I venture upon nothing till I have well considered it; but when once I have taken my resolution, I go directly to my end; I overthrow and mow down all that stands in my way, and then cover the whole with my red mantle." He was fonder of power than money, yet he amassed a princely fortune, which he bequeathed to the king. He was the author of some splendid establishments; he rebuilt the Sorbonne, founded the royal printing-house, the botanical garden, and the French academy. As a writer, he obtained some credit in the controversy with the opponents of the Catholic church; the most famous of his supposed works is, his "Testament Politique," the authenticity of which has been the subject of warm controversy. The letters of Richelieu are said to be interesting, of which the best edition is that of 1696, in two vols. 12mo. Gen. Biog. Hist. of France, three vols. 8vo. 1790.

RICHELIEU, in *Geography*, a town of France, in the department of the Indre and Loire, and chief place of a canton, in the district of Chinon; 11 miles S. of Chinon; deriving its name from cardinal Richelieu, its founder. The place contains 3600, and the canton 12,525 inhabitants, on a territory of 320 kilometres, in 21 communes.

RICHELIEU, a river of Canada, issuing from lake Champlain, and first called "Chamblee," which name was changed by the French into Richelieu at fort Chamblee, and discharging itself into the river St. Lawrence, N. lat. 46° 1'. W. long. 72° 56'.

RICHELIEU Islands, a cluster of small islands in the river St. Lawrence, about 100 in number, 36 miles above Trois Rivières. N. lat. 46° 22'. W. long. 71° 7'.

RICHEMONT, a town of France, in the department of the Moselle, on the Orne; 10 miles S. of Thionville.

RICHENBURG, a town of Bohemia, in the circle of Chrudim; 10 miles S.E. of Chrudim.

RICHENVEIR, a town of France, in the department of the Upper Rhine; six miles N.N.W. of Colmar.

RICHER, JOHN, in *Biography*, a French astronomer and natural philosopher in the 17th century, of whom little is known, till he was admitted a member of the Royal Academy of Sciences at Paris in the year 1666, under the title of astronomer to that body. About 1671, Lewis XIV. sent him to the island of Cayenne in South America, for the purpose of making observations that might contribute to the improvement of astronomical science. After three years he returned, and gave the result of his labours in his "Astronomical and Physical Observations made at the Island of Cayenne," which are inserted in the seventh volume of the "Memoirs" of the Academy of Sciences. Cassini speaks of him with commendation in his "Elements of Astronomy." He died in the year 1696.

RICHER, CLAUDE, a learned priest and mathematician in the 18th century, was born at Auxerre in the year 1680. He was intended for the ecclesiastical profession when very young, and was sent to Paris for his education. Here he distinguished himself in 1701, when only arrived to the years of manhood, by a work which he published, entitled "Universal Gnomonics, or the Science of Dialling," &c. After this he was ordained priest, and remained about ten years

years almost an entire stranger to men of letters, engaged in the religious education of the young. About the year 1730 his passion for mathematical studies revived with great ardour, and he produced a work entitled "General Analysis, containing New Methods of resolving Problems of every kind, and of all degrees to infinity." This work was immediately adopted by the Academy of Sciences, and constitutes the eleventh volume of the "Memoirs." This volume was soon to be followed by three others; these, however, did not make their appearance, which was probably owing to a change in M. Richer's studies. By an accidental perusal of a fragment of Manetho, high priest of Heliopolis, in Egypt, he was induced to devote his whole attention to the most profound researches in ancient history. Notwithstanding the obscurity of this relic of antiquity, he conceived that he thoroughly understood it, and that it furnished him with a clue, by the aid of which he could unravel all the difficulties of ancient history, sacred and profane. Under the influence of this persuasion, he laboured night and day in attempting to illustrate it, till he had produced two immense folio volumes, which no one would undertake to print. As a specimen of his labours, he published "A Chronological Series of the Kings of Egypt, determined according to three simple Dynasties, from the Fragment of Manetho." He died about the year 1756.

RICHERIA, in *Botany*, a genus dedicated by Vahl, to the much neglected memory of Peter Richer de Belleval, first professor of Botany, as well as of Anatomy, at Montpellier, to whom Henry IV. of France committed the care of establishing a public garden in that university. This design was executed in the most skilful and splendid manner. Belleval published a catalogue of the garden in 1598, and a French treatise, in 1605, recommending an enquiry into the native plants of Languedoc. This last was accompanied by five plates, intended as a specimen of a future work, for which he subsequently prepared a number of engravings, rude and stiff in execution, but exhibiting many rare species. He never lived to publish these, and the plates remained neglected in the hands of his family, till Gouan recovered them, and sent impressions to Linnæus. At length Gillibert obtained the plates, and published them in 1796. The two pamphlets above-mentioned were republished in 1785, by the celebrated and unfortunate Broussonet; along with a treatise on the White Mulberry, by Olivier de Serres, originally printed in 1603. Richer de Belleval lived to see his garden destroyed by the fury of civil war, and was beginning to restore it, when he died in 1623, aged 65. His nephew accomplished the re-establishment of the garden, on a more extensive scale. M. Dorthes of Montpellier published, in 1786, *Recherches sur la Vie et les Ouvrages de Pierre Richer de Belleval*, in which every thing, that could be collected on the subject, is recorded. Some writers erroneously mention Belleval as the first botanist who gave copper-plate figures of plants. This honour is due to Fabius Columna, whose *Phytobasanos* appeared in 1592. We must not omit to mention, that Scopoli has named a genus *Bellevalia*, a name, or something like it, which Belleval himself was fond of giving to the Lily of the Valley. Bruguiere, in 1775, called a Madagascar plant *Richeria*, but his genus has not been established.—Vahl *Eclog.* v. 1. 30. Willd. *Sp. Pl.* v. 4. 1122. Mart. *Mill. Dict.* v. 4.—Class and order, *Polygamia Dioecia*; *Dioecia Pentandria*; or rather *Pentandria Monogynia*. Nat. Ord. *Euphorbia*, Juss.

Gen. Ch. Male, *Cal.* Perianth of one leaf, permanent, in four or five ovate, acute, downy segments. *Cor.* Petals

four or five, roundish, the length of the calyx. Nectary four or five glands, at the base of the imperfect germen. *Stam.* Filaments four, five, or six, between the glands of the nectary, erect, longer than the calyx; anthers oblong, two-lobed, erect. *Pist.* Rudiment of a germen superior, conical, villous, style and stigma wanting.

Female, *Cal.* and *Petals* like the male. Nectary a rim round the base of the germen. *Stam.* none. *Pist.* Germen superior, ovate; style very short; stigmas three, revolute, channelled above. *Peric.* Capsule coated, ovate, smooth and even, of three cells, with six valves, separating at the base. *Seeds* solitary, pulpy-coated, pendulous from the top of the central column.

Ess. Ch. Male, Calyx four or five-cleft. Petals four or five. Nectary four or five glands, at the base of the imperfect germen. Stamens four or five.

Female, *Cal.* and *Cor.* like the male. Nectary a rim at the base of the germen. Style very short. Stigmas three, revolute. Capsule coated, of three cells and six valves, splitting at the base. Seeds solitary, pulpy.

1. *R. grandis*. Vahl. *Eclog.* v. 1. 30. t. 4.—Gathered by Ryau, on the sulphur mountain in the island of Montserrat. A tree of a great size. *Leaves* alternate, stalked, oblong, acute, entire, coriaceous, smooth, veiny, six or seven inches in length; very much contracted at the base. *Spikes* axillary, solitary, longer than the footstalks, lax. *Capsule* the size of a hazel-nut. The discoverer of this rare tree is said to have found some of the *flowers* perfect as to *stamens* as well as *pistil*. Hence, notwithstanding the slight differences in the *nectary*, we should incline to place the genus in *Pentandria Monogynia*.

RICHFIELD, in *Geography*, a town of America, in Otsego county, New York, taken from Otsego township, and incorporated in 1792.

RICHFORD, the north-eastermost township of Franklin county, Vermont, situated on Missiscou river; containing 442 inhabitants.

RICH-HILL, a post-town of the county of Armagh, Ireland; 62 miles N.W. from Dublin, and four miles E. from Armagh.

RICHLAND, a district of South Carolina, bounded S. and S.W. by Congaree and Broad rivers, and E. by Wateree river, which divides it from Kershaw and Clermont counties.—Also, a township of Bucks' county, in Pennsylvania, containing 1317 inhabitants.

RICHMAN'S ISLAND, a small American island on the coast of Cumberland county, in the state of Maine; four leagues N. from Wood island and one league W. of Portland. Few vessels put in here, except coasters. Wood island is in N. lat. 43° 50'. W. long. 69° 37'.

RICHMOND, a borough and market-town in the wapentake of Gilling-Well, north riding of Yorkshire, England, is situated on the banks of the river Swale, at the distance of 48 miles N.W. from York, and 293 miles N.N.W. from London. It was anciently much celebrated for its castle, which was founded by the first earl of Richmond, Alan, son of Hoel, count of Brittany. This nobleman, who was nearly related to William, duke of Normandy, accompanied that prince in his expedition to England; and in reward for his services, received from him all the forfeited estates of the brave Edwin, earl of Mercia. This grant was made during the time William was engaged in the siege of York, and is peculiarly remarkable on account of its brevity. Alan immediately after married Hawise, the conqueror's daughter; and being thus loaded both with riches and honour, built the castle, and part of the town of Richmond, to protect his family and his estates against the disinherited and outlawed

RICHMOND.

outlawed Englishmen in those parts. Having no issue by his lady, the earldom of Brittany devolved to Conan le Grosse, his son by a second wife; and Alan, surnamed the Black, son of Hawise by a former husband, obtained the earldom and estates of Richmond. During the reigns of our Norman kings this title and property were possessed by several different families, some of whom were allied to the blood royal, both of England and France. Edward III. conferred the estate on his third son, John of Gaunt, who afterwards surrendered it in exchange for some other lands. The same monarch gave Richmond, with his daughter, in marriage to John, earl of Montford and duke of Brittany, who was surnamed the Valiant. During the wars of York and Lancaster, both the title and the estates several times changed possessors, and at length were vested in the crown by the accession of Henry, earl of Richmond, to the throne, under the title of Henry VII. By his successor, Henry VIII., Richmond was constituted a duchy in the person of his natural son, Henry, who died without issue in the year 1535.

The town of Richmond is comparatively limited in extent and population; containing, according to the late parliamentary returns, only 512 houses, and 3056 inhabitants. Its fine situation, however, and the character of its buildings, which are in general constructed of stone, give it a dignified and interesting appearance. It occupies the top and declivity of a lofty eminence boldly rising from the river Swale, which winds round the town and the castle in a semicircular direction. The chief trade of this place is that of knit woollen stockings, in which men, women, and children, are employed. The market day is Saturday, weekly; and there are besides four annual fairs. The market here is one of the largest in the north of England for corn; and the fairs are noted for a great supply of horses, horned cattle, and sheep. Richmond is a borough by royal charter, and sends two representatives to parliament, who are elected by "those persons who are owners of ancient burgages in the said borough, having a right of pasture in a common field, called Whitecliff pasture." The government of the town is vested, by the charter of queen Elizabeth, in a mayor, recorder, twelve aldermen, twenty-four common council-men, and other inferior officers. The petty sessions for the wapentake of Gilling-West are holden here.

The castle of Richmond stands on the south side of the town, on a bold eminence, overlooking the Swale, which runs in a deep valley beneath. On all sides the approach to it is steep and difficult, except on the north, where the ascent is gradual. The castle is now in a very ruinous condition, but it still retains the features of former grandeur and importance. The keep-tower, of which the shell is nearly entire, is of great altitude; and its exterior walls are more than eleven feet thick. The lower story is supported by a vast column of stone in the centre, from which spring circular arches closing the top. The staircase only reaches to the first chamber, the rest of it being dilapidated, as the floors of the two upper rooms are fallen in. In this keep is a well of excellent water. The ruins of several other parts of this castle yet remain. In the south-eastern corner of the area is a ruinous tower, below which is a dungeon, about fourteen feet deep. The ground covered by this fortress measures nearly six acres in extent, and is the property of the duke of Richmond and Lennox.

The country around Richmond is extremely picturesque, and affords several objects of interest to the tourist and the antiquary. Close to the town, on the north, are the remains of a house of Grey friars, which was founded, in

1258, by Ralph Fitz-Randal, lord of Middleham; and adjoining is the site of a nunnery, now totally demolished. About a mile to the eastward are the fine ruins of St. Agatha abbey, seated on the banks of the river Swale. This monastery was established, in 1151, by Roaldus, constable of Richmond castle, and at the time of the reformation maintained seventeen monks of the Premonstratensian order. Richard Scroope, chancellor of England, was a great benefactor to this monastery; for besides his manor of Brumpton-upon-Swale, he granted 150*l.* a-year for the support of ten additional regular canons, two secular canons, and twenty-two poor men. Near this priory stood an hospital, which being decayed in the reign of Henry VI. was restored by William Ayseough, one of his judges, to whom he had given the patronage of it. A cell for Benedictines, dependent on the abbey of St. Mary of York, was situated on an eminence in this neighbourhood. It was founded, in 1100, by Wymer, chief steward to the earl of Richmond. Many other religious foundations occupied the banks of the Swale, which our limits forbid us to enumerate. The circumstance of the waters of this river having been held sacred, on account of the baptism of 10,000 Saxons near Catterick, by bishop Paulinus, in 627, gave occasion to this multiplicity of religious foundations. Catterick is situated at the distance of five miles from Richmond; and is supposed by several antiquaries to be the site of the Roman Cataractonium, or Cataracton, mentioned in the Itinerary of Antoninus. Dr. Gibson, however, supposes that station stood between the village and the river, and some extensive Roman remains, on the spot, he describes, seems to justify his conjecture. This station continued for some time a Saxon town; but was totally destroyed at an early period by the Danes. The Roman road here divides itself into two branches, one of which leads to Caldwell, distant about eight miles from Richmond, where vestiges of a large town may yet be traced. The Roman name of this station is unknown. A Tour in Scotland 1772, by Thomas Pennant, esq. 4to. Lond. 1790. Beauties of England and Wales, vol. xvi. by John Bigland.

RICHMOND, a village and parish in the hundred of Kingston, and county of Surrey, England, is situated on the south bank of the river Thames, at the distance of ten miles W.S.W. from St. Paul's cathedral, London. It is a spot of great celebrity, both on account of the beauty of its scenery, as well as from having been the site of a royal palace during several centuries. The first authentic mention of the manor here occurs in the reign of king John, at which time it was denominated Sheen, and was the property of Michael Belet, who held it by the service of being the king's butler. In the reign of Edward I. it reverted to the crown, and has since been generally possessed either by the king, or some branch of the royal family. At what precise period the original royal palace was erected is uncertain; for though Edwards I. and II. resided for some time in the manor-house, it does not appear to have been a structure entitled to that appellation. Edward III. is said to have built a palace on his "maner of Shene;" but Manning, the author of the "History and Antiquities of Surrey," inclines to the opinion, that he only improved and enlarged the former building. Be this as it may, it had undoubtedly become a fixed regal residence in the reign of that monarch, who died here the 21st of June, 1377; as did queen Anne, the consort of his successor, Richard II. in the year 1394. The latter prince was so much affected by his loss, that he abandoned the palace, and suffered it to fall to ruin; or, as others assert, pulled it down. From this period Sheen remained in a neglected state, till the accession

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of Henry V. to the throne, when the palace was rebuilt in a style of greater magnificence than before, and in such a manner, as to render it "a delightful mansion of curious and costly workmanship, and befitting the character and condition of a king." Of Henry VI. we discover no trace here, nor does it appear that Edward IV. ever occupied the palace; but it is recorded, that he granted it, in the sixth year of his reign, to his queen, Elizabeth, to be held by her during her life. Henry VII. gave the custody of the manor to Robert Skeene; and on the death of his own mother-in-law, the queen dowager, in 1486, took possession of the palace, which he frequently made his residence. In 1492 he held a grand tournament here, at which sir James Parker, in a controversy with Hugh Vaughan, for right of coat of armour, was killed in the first course. Seven years subsequent, the king being then at the palace, it was set on fire by accident, and almost totally destroyed. Henry, however, soon replaced it by another, which was built in a style of much "magnificence and elegance;" and on this occasion changed the name of the manor to Richmond, in reference to his own title before he obtained the crown. The picture of Henry V. and his family, the marriage of Henry VI. and that of Henry VII. in the Strawberry-hill collection, are supposed to have been painted for this monarch, and intended for the palace of Richmond. It had been finished only a short time, when another fire broke out, which did considerable damage. One of the newly erected galleries also fell in the same year, only a few minutes after the king and his son had been walking in it. Philip I., king of Spain, was entertained here with great magnificence in the year 1506; and king Henry VII. died here 21st April, 1509. His successor kept his Christmas at Richmond the year succeeding his accession to the throne; and on the 12th of January ensuing a tournament was held in the park, when the monarch himself, for the first time, took a part in the exercises. Charles V. was lodged at Richmond in the year 1523. King Henry VIII. had a son of his own name born here, who died when scarcely two months old. Queen Elizabeth was imprisoned in the palace by her sister, queen Mary; and after she was seated on the throne, it became one of her favourite places of residence. In her reign, Eric IV., king of Sweden, was lodged here, and here she herself ended her days, on the 24th of March, in the year 1603. In the autumn of the same year the several courts of justice were removed hither from London to avoid the plague, which was then raging with great vehemence in the capital. Henry, prince of Wales, resided here in 1605, and in 1625 the courts were a second time adjourned to Richmond for the same reason as before mentioned. Charles I. was frequently at this palace, where he formed a large collection of pictures. In 1636 lord Buckhurst, and lord Edward Sackville, performed a mask before his majesty and his royal consort. When the same monarch was in Scotland, the parliament ordered that the young prince should be sent to Richmond with his governor, probably bishop Duppa, who is said to have educated Charles II. at this place. In the month of June, 1647, the palace was prepared for the king's reception, but he is generally stated to have refused to go to it. Mr. Lysons, however, quotes a newspaper of the 29th of August in that year, as mentioning that the prince elector was then at Richmond, and that the king, with the duke of York, hunted in the New Park, and killed a stag and a buck. During the commonwealth, the palace was sold by the commissioners of the house of commons, who ordered a survey of it to be taken, as it then existed. From this document we learn,

that the great hall measured 100 feet in length, and 40 in breadth; and that it had a screen at one extremity, and a turret or clock-case, covered with lead, at the other. The same record describes the privy lodgings as a free-stone building, three stories high, and surmounted by fourteen turrets. A "canted tower," with a staircase of 124 steps, is likewise noticed; also a chapel 96 feet long, and 40 broad; and a privy garden, with an open gallery 200 feet in length, over which was a clove gallery of the same extent; but no mention is made of a library, though a French writer asserts, that a royal library was established at Richmond by Henry VII. and the librarian is enumerated among the officers of this palace in the household establishments of queen Mary and queen Elizabeth. The survey further mentions three pipes, which supplied the palace with water, one from the white conduit in the New Park, another from the red conduit in the town-fields; and a third from a conduit near the alms-houses, which are situated close to the river. The materials of the palace are there valued at 10,782*l.* 19*s.* 2*d.* It was purchased by Thomas Rookesby, William Goodrick, and Adam Baynes, on behalf of themselves and other creditors, and shortly after resold by them to sir George Norton, who had been one of the commissioners appointed to sit in judgment on Charles I. On the restoration, this gentleman having been deprived of his estates by confiscation, Richmond palace was bestowed on the queen mother, but it is probable, that at this period it was in a very dismantled state. Indeed Fuller, who wrote soon after the restoration, speaks of it as pulled down; but this could not literally be the case, as it seems to have been inhabited subsequent to his day. Now, however, it is totally demolished, except a few of the out-offices, and its site is occupied by several houses, which are held on lease from the crown. One of these, the property of the late duke of Queensberry, was built by the third earl of Cholmondeley, who ornamented it with a very fine collection of pictures. The tapestry, which hung behind the earl of Clarendon in the court of chancery, still decorates the hall of this mansion. The first mention made of a park at Richmond is in the reign of Edward I. This is the park which, in the time of Henry VIII. was called the Old or Great Park, in contradistinction to another adjoining, called the New Park, which had been formed by the predecessor of that monarch. The lodge belonging to it was for some months the residence of the celebrated cardinal Wolsey, after he had lost the favour of his capricious and tyrannical master. Charles I. having formed a third park of far greater extent than both the former ones united, they appear to have merged into one soon after, as in the survey taken in 1649, only two parks are mentioned, *viz.* that lately inclosed by the monarch, called the New Park, and another styled the Little or Old Park. This last was valued at 220*l.* 3*s.* *per annum*, and was purchased by William Brome of London for 7048*l.* The lodge already mentioned was afterwards possessed by sir Thomas Jervase, and the park by sir John Trevor, in lease from the crown, to which the whole manor reverted at the restoration. King William afterwards granted the lodge, together with the stewardship of the manor, to John Latton, esq., who held them till the death of that prince. In 1707, they were granted by queen Anne to James, duke of Ormond, who rebuilt the lodge, and resided there till his attainer in 1715, when he privately withdrew to Paris. By act of parliament, passed in 1721, the earl of Arran, his brother, having been enabled to purchase his estates, king George II., then prince of Wales, bought this of Richmond from him, and frequently retired hither, even after his accession to the throne.

throne. His queen, Caroline, was very partial to the spot, and had a dairy and menagerie here; several ornamental buildings were also dispersed by the same princess throughout the gardens, in one of which, called the Hermitage, she placed the busts of Newton, Locke, and other eminent literary characters. His present majesty frequently resided here in the early part of his reign; and was so strongly attached to the place, that he ordered the old lodge to be demolished with the view of building a magnificent palace on its site, which, however, has never risen above the foundation; but an observatory has been erected at a short distance from it, according to designs furnished by sir William Chambers. Here is a mural arc of 140 degrees and eight feet radius; a zenith sector of twelve feet; a transit instrument of eight feet; and a ten-foot reflector by Herschel. On the top of the building is a moveable dome, which contains an equatorial instrument. Part of the Old Park forms a grazing and a dairy farm in his majesty's own occupancy. The remainder constitutes the royal gardens, which were first laid out by Bridgeman, and afterwards altered to their present improved state by Brown. The other park, *viz.* the New or Great Park, made by Charles I. met with great opposition to its formation, and may be reckoned among the impolitic measures of his reign. It was presented to the common council of London by the parliament; but was restored to the crown in 1660. The rangership of this park is considered an office of high dignity and trust, and has been frequently held by a female branch of the royal family.

Within Richmond parish were anciently situated several religious houses. Edward II. founded here a convent of Carmelite friars, and endowed it with an annual income of 120 marks out of his exchequer; but only two years after its establishment he removed the monks to Oxford. Henry V. also founded here a house for the maintenance of friars of the Carthusian order, whom he incorporated by the name of the House of Jesus of Bethlehem, at Shene. The foundation charter describes it as built on the north side of the palace; and it appears from records to have been a structure of great extent and magnificence. At the dissolution its annual revenues were estimated at 962*l.* 11*s.* 6*d.*, and shortly after its site was granted to Edward, earl of Hertford. A third convent was erected here by Henry VII. about the year 1499, and filled with friars of the Franciscan order. This establishment was suppressed in 1534, but its value is not recorded.

Richmond church is dedicated to St. Mary Magdalen, and consists of a nave, two aisles, and a chancel, built of bricks, with a square embattled tower at the west end, constructed of stone and flints in chequers. The principal monuments here are those of Henry, lord viscount Brounker, cofferer to king Charles II.; admiral Holborn; sir Matthew Decker; lady Chaworth, relict of sir Richard Chaworth, who died in 1689; lady Howard, relict of William lord Howard of Eserick; James Thompson, author of the "Seasons;" and that of Mrs. Yates, the celebrated actress, who died in 1787. This church is in the diocese of Winchester, and in the deanery of Ewell. According to the parliamentary returns of 1811, the parish contains 875 houses, and 5219 inhabitants. History and Antiquities of the County of Surrey, by the late Rev. Owen Manning, S.T.P. continued by William Bray, esq. of Shire, fol. vol. i. 1804. Salmon's Antiquities of Surrey, 8vo. 1732. Lysons's Environs of London, vol. i. 4to. Maurice's Richmond, a poem, 4to.

RICHMOND, a township of America, on the W. line of Massachusetts, in Berkshire county; 17 miles W. by S. from Lenox, and 150 W. of Boston. Iron ore of the

best quality is found here; but as it lies deep, it is raised at a great expence. It abounds with lime-stone, and coarse, white, and clouded marble. It was incorporated in 1775, and contains an iron-work, three grist-mills, a fulling-mill, two saw-mills, with 1041 inhabitants.—Also, a township of Cheshire county, New Hampshire, on the Massachusetts line, about 11 miles E. of Connecticut river, and 97 W. by S. from Portsmouth. It was incorporated in 1752, and contains 1290 inhabitants.—Also, a township in Washington county, Rhode island, separated from Hopkington on the W. by Ward's river, a branch of Paucatuck river. It is distant about 19 miles W. of Newport, and contains 1330 inhabitants.—Also, a county of New York, comprehending the whole of Staten island; which see.—Also, a county of North Carolina, in Fayette district, bounded S. by the state of South Carolina, and N. by Moore county. It contains 6695 inhabitants. The chief town is Rockingham. The S.E. part of the county is a continued plain, covered in many places by pines, and mostly inhabited by Scotsmen. The upper part has hills and vallies. In the middle and east parts large tracts remain uncultivated. The inhabitants, with regard to religion, are Presbyterians, Baptists, Methodists, and Quakers. Their houses are logs, covered with slabs.—Also, a county of Virginia, bounded N. and N.E. by Westmoreland, and S. and S.W. by Rappahannock river, which separates it from Essex county. It contains 6214 inhabitants. The court-house is 273 miles from Philadelphia.—Also, the present seat of government of the state of Virginia, situated in Henrico county, on the N. side of James' river, at the foot of the falls, and containing between 400 and 500 houses; built partly on the bank of the river so as to be convenient for trade, and partly upon an eminence that overlooks the lower part of the town, and commands an extensive prospect of the river and country. The new houses are well built, and the state-house is on the hill. In this town is an elegant statue of the illustrious Washington, executed at Paris. The lower part of the town is divided by a creek, over which is a convenient bridge. Another bridge of curious construction connects the city with Manchester. The public buildings, besides the state-house, are an episcopal church, a court-house, gaol, theatre, and three tobacco warehouses. At the W. end of the town are several mills. Near the mills are a distillery and brewery. The falls above the bridge are seven miles in length. A noble canal is cut on the N. side of the river, which terminates in a basin of about two acres, in the town of Richmond. Richmond is 626 miles from Boston, 374 from New York, 176 from Baltimore, 278 from Philadelphia, 247 from Fayetteville, 497 from Charleston, and 662 from Savannah. N. lat. 37° 40'. W. long. 77° 50'.—Also, a county of the upper district of Georgia, in which is situated the city of Augusta; it is separated from South Carolina on the E. by Savannah river, and contains six towns and 6189 inhabitants.—Also, a township in Chittenden county, Vermont, established in 1794: it contains an excellent tract of land, and lies on both sides of Onion river. It has 935 inhabitants.—Also, a town, or rather village, in the island of St. Vincent, in the West Indies; situated at the head of a deep bay, on the W. side of the island. Chateaubelair river runs on the S. side of the town, which gives name to the bay. Another river on the N. side of the town empties into the bay.—Also, a township in Lenox county, Upper Canada, N. of Fredericksburgh in the bay of Quinte, and watered in front by the river Appennie.

RICHMOND Bay, a bay on the N. coast of the island of St. John, in the gulf of St. Lawrence.

RICHOLD, or **RICHELD**, a town of France, in the department of the Roer, near the Meuse; two miles N.W. of Dalem.

RICHTENBERG, a town of Anterior Pomerania; 28 miles E.N.E. of Rostock. N. lat. 54° 11'. E. long. 12° 50'.

RICHTENSWYL, a town of Switzerland, situated on the W. side of the lake of Zurich, in the canton of Zurich, with a convenient harbour; 11 miles S. of Zurich.

RICHTER, FRANCIS-XAVIER, in *Biography*. There are six musicians, male and female, recorded in Gerber's Continuation of Walther's Lexicon; among whom, the most celebrated and best known in England was Francis-Xavier, whose works, of various kinds, have great merit. His harmony is correct; the subjects are often new and noble; but his detail and manner of treating them are frequently dry and sterile, and he spins and repeats passages in different keys without end. The French and Italians have a term for this tediousness, which is wanting in our language, they call it *rosalie*, or *rosalia*; derived from the name of a female saint, remarkable for repeating her "Pater noster," and stringing her beads more frequently than even St. Dominic himself, or than any other pious person, that has merited a place in the Golden Legend. An Italian cries out, upon hearing a string of repetitions, either a note higher, or a note lower, of the same passage or modulation, *ah santa Rosalia!* Indeed this species of iteration indicates a want of invention in a composer, as much as flammering and hesitation imply a want of wit or memory in a story-teller. He died at Strasburgh in 1789, in the 80th year of his age.

RICIMER, count and patrician of the Western empire, and an important civil and military character in the fifth century, served from his youth in the Roman armies, in which he acquired great reputation by his warlike exploits, and at length came to be regarded as the ablest commander of the age. In the reign of the emperor Avitus, being one of the chief commanders of the Barbarian troops which formed the defence of Italy, he destroyed, in the year 456, on the coast of Corsica, a fleet of Genseric, the Vandal king, destined to ravage the coasts of Gaul or Italy. His success in this instance enabled him to avail himself of the public discontent to depose Avitus, and raise Majorian to the throne in the year 457. Not being raised to the dignity which he expected under this prince, he compelled him to abdicate the purple, which act was soon followed by his death. Ricimer next raised an obscure man, named Libius Severus, to the throne, who bore the title of emperor during four years without performing any one imperial function. In that period, and in an interregnum of two years more, Ricimer exerted sovereign authority, amassing treasures, forming a separate army, and negotiating alliances. His own mean birth prevented him from assuming the purple, and in 467 he concurred in the inauguration of Anthemius, whose daughter he married. The new emperor and his son-in-law passed some years in union, but at length dissensions broke out between them, which ended in the murder of the emperor, and Olybrius was proclaimed in his stead. Thus a third, or perhaps a fourth, emperor was added to the number of Ricimer's victims; but in a few weeks after the massacre of Anthemius, "Italy," says Gibbon "was delivered by a painful disease from the tyrant Ricimer, who bequeathed the command of his army to his nephew Gundobald, one of the princes of the Burgundians." Gibbon's Rom. Hist. vol. vi.

RICINA, in *Ancient Geography*, an island situated on the coast of Hibernia, being one of those called Ebudes, according to Ptolemy and Pliny.—Also, a town of Italy, in the Picenum, which became a Roman colony under the reign of the emperor Severus. It was situated S.W. of Auximum.—Also, a town of Italy, in Liguria, S.E. of Genoa.

RICINOCARPODENDRON, compounded of *ricinus*, καρινον, *fructus*, and *δενδρον*, *arbor*, in *Botany*, the name of a genus of plants, established by Dr. Amman, the characters of which are these: the flower is of the rosaceous kind, consisting of three petals, disposed in a circular order, in the centre of which there arises a large and open tube, through which shoots up the pistil, which grows at the bottom of the cup; this pistil, finally, becomes a trigonal fruit, divided into three cells within, and containing each one seed in a rough coat.

The leaves of this tree sometimes resemble those of the ash, being composed of three or four pairs of smaller leaves joined to a middle rib, these are not serrated, and terminate in a sharp point; the flowers grow at the axæ of the leaves, they are white, and are disposed in lax spikes; the fruit is green at first, afterwards it becomes of a yellowish-red, and finally scarlet; it is of the bigness of a walnut, and in shape much resembles the fruit of the ricinus; the covering of the seeds is black on the outside, and red within, and each seed is divided into two lobes; when ripe, the fruit bursts, and the seeds fall out. It is a native of the East Indies. Aët. Petropol. vol. iii. p. 214.

RICINOCARPOS, from the resemblance of the fruit to *Ricinus*. See ACALYPHIA, CROTON, MERCURIALIS, TRAGIA.

RICINOIDES. See CEANOTHIUS, CROTON, JATROPHIA.

RICINUS, so denominated from the resemblance its seed has to the little insect called a tick, *Ricinus*; and this, according to Ainsworth, is compounded of *re* and *canis*, because the tick, or tyke, is particularly annoying to dogs, by fixing itself upon their ears and other parts. It is the *Κικιν* or *Κροτων* of Dioscorides, words expressive of the likeness of its seed to the above-named insect; the former of these appellations, however, is of eastern origin, and of rather uncertain signification, occurring in the prophet Jonah. Pliny mentions an Egyptian herb called *Palma-Christi*, with seeds like a tyke.—Linn. Gen. 503. Schreb. 655. Willd. Sp. Pl. v. 4. 564. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 331. Pursh v. 2. 602. Tournef. t. 307. Juss. 388. Lamarck Dict. v. 6. 200. Illustr. t. 792. Gærtn. t. 107. Loureir. Cochinch. 584.—Class and order, *Monoecia Monadelphica*. Nat. Ord. *Tricocceæ*, Linn. *Euphorbia*, Juss.

Gen. Ch. Male, *Cal.* Perianth inferior, of one leaf, cloven into five, ovate, concave segments. *Cor.* none. *Stam.* Filaments very numerous, thread-shaped, united unequally below into various sets; anthers twin, roundish.

Female on the same plant with the male, *Cal.* Perianth inferior, of one leaf, deciduous, cloven into three, ovate, concave segments. *Cor.* none. *Pist.* Germen superior, ovate, covered with awl-shaped brittle bodies; styles three, cloven, erect and spreading, hispid; stigmas simple. *Peric.* Capsule roundish, three-furrowed, generally prickly all over, of three cells and three valves. *Seeds* solitary, nearly ovate.

Eff. Ch. Male, Calyx five-cleft. Corolla none. Stamens numerous. Female, Calyx three-cleft. Corolla none. Styles three, cloven. Capsule three-celled. Seed solitary.

RICINUS.

Obf. Willdenow divides this genus into two fections; the firft containing fuch fpecies as have *palmate leaves*, the fecond thofe which have fimple, *undivided leaves*.

Seft. 1. *Leaves palmate.*

1. *R. communis*. Common Palma-Chrifti, or Caftor-oil Plant. Linn. Sp. Pl. 1430. Woodv. Med. Bot. 171. t. 61.—Leaves peltate; lobes lanceolate, ferrated. Stem herbaceous, pruinofe. Stigmas three, cloven at the tip.—Native of the Eaft and Weft Indies. Firft cultivated in England, as appears from Turner's Herbal, in 1562. It flowers in July and Auguft. *Root* biennial or annual, long, thick, and fibrous. *Stems* round, thick, jointed, channelled, glaucous; of a purplifh-red colour upwards. *Leaves* large, deeply divided into feven fegments, on long, tapering, purplifh ftalks. *Flowers* in long, green, and glaucous fpike, fpringing from the divifions of the branches; the males form the lower part of the fpike, the females the upper. *Seeds* ovate, fhining, black dotted with white.

The prefent fpecies is fubject to confiderable variations. In our gardens it is a ftrong, luxuriant, shrubby annual. In Africa it becomes a tree. Clufius obferved it in Spain, with a trunk as large as a man's body, and fifteen or twenty feet high. And Ray faw it in Sicily as big as our common Elder-trees, woody and long-lived. From the feeds of this valuable plant is extracted the *oleum ricini*, or caftor-oil, fo important for its medicinal properties as a gentle, though moft effectual, cathartic.

2. *R. viridis*. Green Palma-Chrifti. Willd. n. 2. Hort. Berol. v. 1. t. 49.—Leaves peltate; lobes oblong, toothed, the middle one flightly three-lobed. Stem herbaceous, pruinofe. Stigmas fix.—Native of the Eaft Indies, flowering at Kew, in Auguft. Very like the laft, but always annual, with a taller and fomewhat lefs pruinofe *ftem*. *Leaves* larger, and not fo diftinctly palmate.

3. *R. africanus*. African Palma-Chrifti. Willd. n. 3. (*R. communis*; Desfont. Atlant. v. 2. 355.)—Leaves peltate; lobes oblong, ferrated. Stem shrubby, fmoth.—Native of the north of Africa. *Stem* arboreous, or rather shrubby, not pruinofe. *Leaves* fmallier than in the preceding. *Stigmas* fix, or more properly three, cloven down to the bafe.

4. *R. lividus*. Dark-leaved Palma-Chrifti. Willd. n. 4. Jacq. Ic. Rar. t. 196. Misc. v. 2. 360.—Leaves peltate, coloured; lobes oblong, ferrated. Stem shrubby, fmoth, coloured.—Native of the Cape of Good Hope, whence it was introduced at Kew in 1795. A *tree* ten feet or more in height. *Stem*, during the firft year, blood-red and fhining, afterwards woody and thick, afh-coloured and ftreaked. *Leaves* divided into eight or ten lobes, of a dark blood-red colour, on long, glandular ftalks. *Flowers* green. *Fruit* of a livid colour, with long, foft prickles. *Seeds* fhining, variegated with black and brown.

5. *R. inermis*. Smooth-fruited Palma-Chrifti. Willd. n. 5. Jacq. Ic. Rar. t. 195. Misc. v. 2. 362.—Leaves peltate; lobes oblong, ferrated. Stem shrubby, pruinofe. Capfules without prickles.—Native both of the Eaft and Weft Indies. In habit much refembling the laft, but altogether ftouter. *Stem* brown, spotted with dark purple. *Leaves* very large, on long ftalks. *Fruit* ovate, rugofe, dark green.

6. *R. fpeciofus*. Beautiful Palma-Chrifti. Willd. n. 6. Burman. Ind. 207. t. 63. f. 2.—Leaves peltate, inclining to digitate; leaflets lanceolate, ferrated.—Native of Java. We know not that this is any where defcribed or figured, except as it occurs in the above authors.

Seft. 2. *Leaves fimple, or undivided.*

7. *R. Tanarius*. Scollop-leaved Palma-Chrifti. Linn.

Sp. Pl. 1430. (*Tanarius minor*; Rumph. Amboin. v. 3. 190. t. 121.)—Leaves peltate, ovate, pointed, wavy, toothed.—Native of the Eaft Indies, and woods of Cochinchina. It flowers at Kew, from July to September. A middling fized *tree*, with twifted, fpreeding *branches*. *Leaves* on long ftalks, fcattered, fragrant. *Flowers* in long, fimple, terminal clufters.

8. *R. dioicus*. Dioecious Palma-Chrifti. Willd. n. 8. Forft. Prodr. 67.—Leaves heart-shaped, pointed, nearly entire. Flowers dioecious. Capfules muricated.—Native of Tanna ifland. This *frub* has round, fmoth, brown *branches*, the younger ones white with down. *Leaves* alternate, entire, or very obfcurely toothed; fmoth above with downy veins; resinous and dotted beneath. *Female flowers* in fmall, axillary, ftalked *clufters*. *Braëea* folitary, ovate, pointed, very large, at the bafe of every flower.

9. *R. globofus*. Globular Palma-Chrifti. Willd. n. 9. (Croton globofum; Swartz Ind. Occ. v. 2. 1181.)—Leaves ovate, obtufe, entire. Flowers dioecious. Capfules globular.—Native of lofty mountains in Jamaica. A branched, erect *frub*, four or five feet high. *Branches* round, ftriated, afh-coloured. *Leaves* alternate, ftalked, coriaceous. *Flowers* in terminal, fhort, erect *clufters*. *Capfule* roundifh, the fize of a pea.

10. *R. integrifolius*. Simple-leaved Palma-Chrifti. Willd. n. 10.—Leaves ovate, pointed, entire, coriaceous.—Native of the Mauritius. Adopted folety on Willdenow's authority, who defcribes it as "a *frub* with round, brown, fmoth, divided *branches*. *Leaves* fmoth, on channelled ftalks two or three inches long. *Clufters* axillary. *Flowers* and *Fruit* unknown. It appears to be dioecious."

RICINUS, in *Gardening*, contains plants of the tall, herbaceous, tender, annual kind, of which the fpecies cultivated is the common palma-Chrifti (*R. communis*).

This plant becomes a tree in its native fituation, and the feeds afford the caftor-oil of the fops.

And there are feveral varieties of it, as the great American palma-Chrifti, which has brown ftalks that divide into two or three branches, and rife fix or feven feet high; the leaves are broader, and not fo deeply divided; they are of a deep green on both fides, and are unequally ferrate. The fpike of flowers are fhorter, the feed-velfels rounder and of a brownifh colour, and the feeds are much lefs, and brown. This fort is a native of the Weft Indies.

Alfo the green-ftalked American palma-Chrifti, which has a thick herbaceous *ftem*, of a greyifh-green, with the joints not fo far afunder as in the preceding fort: it rife about four feet high, and is divided at the top into three or four branches, which fpread out almoft horizontally; the leaves are large, of a deep green on their upper fide, but greyifh on their under; they are deeply cut into fix or feven (fometimes eight) lanceolate fegments, which are unequally ferrate: the petioles fpread out more horizontally than thofe of the common fort, and are much fhorter: the principal ftalk and branches are terminated by loofe fpike of flowers; the covers of the capfules are green, and clofely armed with foft fpines; the feeds are fmallier and lighter coloured than thofe of the preceding fort. This is alfo a native of the Weft Indies.

Likewife the wrinkled-capsuled palma-Chrifti, which rife with an herbaceous ftalk about four feet high; the lower part is purplifh, and the upper deep green, the joints pretty far afunder; the leaves are of a deep green on their upper fide, but paler underneath; they are not fo deeply divided as fome of the others, and are more regularly ferrate; the fpike of flowers are large; the males have more ftamens, with yellow anthers; the capfules are oval and wrinkled,

RICHOLD, or **RICHELD**, a town of France, in the department of the Roer, near the Meuse; two miles N.W. of Dalem.

RIGHTENBERG, a town of Anterior Pomerania; 28 miles E.N.E. of Rostock. N. lat. $54^{\circ} 11'$. E. long. $12^{\circ} 50'$.

RICHTENSWYL, a town of Switzerland, situated on the W. side of the lake of Zurich, in the canton of Zurich, with a convenient harbour; 11 miles S. of Zurich.

RICHTER, FRANCIS-XAVIER, in *Biography*. There are six musicians, male and female, recorded in Gerber's Continuation of Walther's Lexicon; among whom, the most celebrated and best known in England was Francis-Xavier, whose works, of various kinds, have great merit. His harmony is correct; the subjects are often new and noble; but his detail and manner of treating them are frequently dry and sterile, and he spins and repeats passages in different keys without end. The French and Italians have a term for this tediousness, which is wanting in our language, they call it *rosalie*, or *rosalia*; derived from the name of a female saint, remarkable for repeating her "Pater noster," and stringing her beads more frequently than even St. Dominic himself, or than any other pious person, that has merited a place in the Golden Legend. An Italian cries out, upon hearing a string of repetitions, either a note higher, or a note lower, of the same passage or modulation, *ah Santa Rosalia!* Indeed this species of iteration indicates a want of invention in a composer, as much as flammering and hesitation imply a want of wit or memory in a story-teller. He died at Strasburgh in 1789, in the 80th year of his age.

RICIMER, count and patrician of the Western empire, and an important civil and military character in the fifth century, served from his youth in the Roman armies, in which he acquired great reputation by his warlike exploits, and at length came to be regarded as the ablest commander of the age. In the reign of the emperor Avitus, being one of the chief commanders of the Barbarian troops which formed the defence of Italy, he destroyed, in the year 456, on the coast of Corsica, a fleet of Genserich, the Vandal king, destined to ravage the coasts of Gaul or Italy. His success in this instance enabled him to avail himself of the public discontent to depose Avitus, and raise Majorian to the throne in the year 457. Not being raised to the dignity which he expected under this prince, he compelled him to abdicate the purple, which act was soon followed by his death. Ricimer next raised an obscure man, named Libius Severus, to the throne, who bore the title of emperor during four years without performing any one imperial function. In that period, and in an interregnum of two years more, Ricimer exerted sovereign authority, amassing treasures, forming a separate army, and negotiating alliances. His own mean birth prevented him from assuming the purple, and in 467 he concurred in the inauguration of Anthemius, whose daughter he married. The new emperor and his son-in-law passed some years in union, but at length dissensions broke out between them, which ended in the murder of the emperor, and Olybrius was proclaimed in his stead. Thus a third, or perhaps a fourth, emperor was added to the number of Ricimer's victims; but in a few weeks after the massacre of Anthemius, "Italy," says Gibbon "was delivered by a painful disease from the tyrant Ricimer, who bequeathed the command of his army to his nephew Gundobald, one of the princes of the Burgundians." Gibbon's Rom. Hist. vol. vi.

RICINA, in *Ancient Geography*, an island situated on the coast of Hibernia, being one of those called Ebudes, according to Ptolemy and Pliny.—Also, a town of Italy, in the Picenum, which became a Roman colony under the reign of the emperor Severus. It was situated S.W. of Auximum.—Also, a town of Italy, in Liguria, S.E. of Genoa.

RICINOCARPODENDRON, compounded of *ricinus*, $\alpha\kappa\epsilon\pi\tau\epsilon\sigma$, *fructus*, and $\delta\epsilon\upsilon\delta\epsilon\sigma\upsilon$, *arbor*, in *Botany*, the name of a genus of plants, established by Dr. Amman, the characters of which are these: the flower is of the rosaceous kind, consisting of three petals, disposed in a circular order, in the centre of which there arises a large and open tube, through which shoots up the pistil, which grows at the bottom of the cup; this pistil, finally, becomes a trigonal fruit, divided into three cells within, and containing each one seed in a rough coat.

The leaves of this tree sometimes resemble those of the ash, being composed of three or four pairs of smaller leaves joined to a middle rib, these are not serrated, and terminate in a sharp point; the flowers grow at the axæ of the leaves, they are white, and are disposed in lax spikes; the fruit is green at first, afterwards it becomes of a yellowish-red, and finally scarlet; it is of the bigness of a walnut, and in shape much resembles the fruit of the ricinus; the covering of the seeds is black on the outside, and red within, and each seed is divided into two lobes; when ripe, the fruit bursts, and the seeds fall out. It is a native of the East Indies. Act. Petropol. vol. iii. p. 214.

RICINOCARPOS, from the resemblance of the fruit to *Ricinus*. See ACALYPHA, CROTON, MERCURIALIS, TRAGIA.

RICINOIDES. See CEANOTHUS, CROTON, JATROPHA.

RICINUS, so denominated from the resemblance its seed has to the little insect called a tick, *Ricinus*; and this, according to Ainsworth, is compounded of *re* and *canis*, because the tick, or tyke, is particularly annoying to dogs, by fixing itself upon their ears and other parts. It is the $\kappa\iota\kappa\iota$ or $\kappa\epsilon\sigma\tau\alpha\upsilon$ of Dioscorides, words expressive of the likeness of its seed to the above-named insect; the former of these appellations, however, is of eastern origin, and of rather uncertain signification, occurring in the prophet Jonah. Pliny mentions an Egyptian herb called *Palma-Christi*, with seeds like a tyke.—Linn. Gen. 503. Schreb. 655. Willd. Sp. Pl. v. 4. 564. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 331. Pursh v. 2. 602. Tournef. t. 307. Juss. 388. Lamarck Dict. v. 6. 200. Illustr. t. 792. Gærtn. t. 107. Loureir. Cochinch. 584.—Class and order, *Monoecia Monadelphica*. Nat. Ord. *Tricocca*, Linn. *Euphorbia*, Juss.

Gen. Ch. Male, *Cal.* Perianth inferior, of one leaf, cloven into five, ovate, concave segments. *Cor.* none. *Stam.* Filaments very numerous, thread-shaped, united unequally below into various sets; anthers twin, roundish.

Female on the same plant with the male, *Cal.* Perianth inferior, of one leaf, deciduous, cloven into three, ovate, concave segments. *Cor.* none. *Pist.* Germen superior, ovate, covered with awl-shaped bristly bodies; styles three, cloven, erect and spreading, hispid; stigmas simple. *Peric.* Capsule roundish, three-furrowed, generally prickly all over, of three cells and three valves. *Seeds* solitary, nearly ovate.

Eff. Ch. Male, Calyx five-cleft. Corolla none. Stamens numerous. Female, Calyx three-cleft. Corolla none. Styles three, cloven. Capsule three-celled. Seed solitary.

RICINUS.

Obf. Willdenow divides this genus into two fections; the first containing fuch species as have *palmate leaves*, the fecond thofe which have fimple, *undivided leaves*.

Seft. 1. *Leaves palmate.*

1. *R. communis*. Common Palma-Chrifti, or Caftor-oil Plant. Linn. Sp. Pl. 1430. Woodv. Med. Bot. 171. t. 61.—Leaves peltate; lobes lanceolate, ferrated. Stem herbaceous, pruinofe. Stigmas three, cloven at the tip.—Native of the Eaft and Weft Indies. First cultivated in England, as appears from Turner's Herbal, in 1562. It flowers in July and Auguft. *Root* biennial or annual, long, thick, and fibrous. *Stems* round, thick, jointed, channelled, glaucous; of a purplifh-red colour upwards. *Leaves* large, deeply divided into feven fegments, on long, tapering, purplifh ftalks. *Flowers* in long, green, and glaucous fpikes, fpringing from the divifions of the branches; the males form the lower part of the fpike, the females the upper. *Seeds* ovate, fhining, black dotted with white.

The prefent fpecies is fubject to confiderable variations. In our gardens it is a ftrong, luxuriant, shrubby annual. In Africa it becomes a tree. Clufius obferved it in Spain, with a trunk as large as a man's body, and fifteen or twenty feet high. And Ray faw it in Sicily as big as our common Elder-trees, woody and long-lived. From the feeds of this valuable plant is extracted the *oleum ricini*, or caftor-oil, fo important for its medicinal properties as a gentle, though moft effectual, cathartic.

2. *R. viridis*. Green Palma-Chrifti. Willd. n. 2. Hort. Berol. v. 1. t. 49.—Leaves peltate; lobes oblong, toothed, the middle one flightly three-lobed. Stem herbaceous, pruinofe. Stigmas fix.—Native of the Eaft Indies, flowering at Kew, in Auguft. Very like the laft, but always annual, with a taller and fomewhat lefs pruinofe *ftem*. *Leaves* larger, and not fo diftinctly palmate.

3. *R. africanus*. African Palma-Chrifti. Willd. n. 3. (*R. communis*; Desfont. Atlant. v. 2. 355.)—Leaves peltate; lobes oblong, ferrated. Stem shrubby, fmooth.—Native of the north of Africa. *Stem* arboreous, or rather shrubby, not pruinofe. *Leaves* fmallier than in the preceding. *Stigmas* fix, or more properly three, cloven down to the bafe.

4. *R. lividus*. Dark-leaved Palma-Chrifti. Willd. n. 4. Jacq. Ic. Rar. t. 196. Misc. v. 2. 360.—Leaves peltate, coloured; lobes oblong, ferrated. Stem shrubby, fmooth, coloured.—Native of the Cape of Good Hope, whence it was introduced at Kew in 1795. *A tree* ten feet or more in height. *Stem*, during the first year, blood-red and fhining, afterwards woody and thick, afh-coloured and streaked. *Leaves* divided into eight or ten lobes, of a dark blood-red colour, on long, glandular ftalks. *Flowers* green. *Fruit* of a livid colour, with long, foft prickles. *Seeds* fhining, variegated with black and brown.

5. *R. inermis*. Smooth-fruited Palma-Chrifti. Willd. n. 5. Jacq. Ic. Rar. t. 195. Misc. v. 2. 362.—Leaves peltate; lobes oblong, ferrated. Stem shrubby, pruinofe. Capfules without prickles.—Native both of the Eaft and Weft Indies. In habit much refembling the laft, but altogether ftouter. *Stem* brown, spotted with dark purple. *Leaves* very large, on long ftalks. *Fruit* ovate, rugofe, dark green.

6. *R. fpeciofus*. Beautiful Palma-Chrifti. Willd. n. 6. Burman. Ind. 207. t. 63. f. 2.—Leaves peltate, inclining to digitate; leaflets lanceolate, ferrated.—Native of Java. We know not that this is any where defcribed or figured, except as it occurs in the above authors.

Seft. 2. *Leaves fimple, or undivided.*

7. *R. Tanarius*. Scollop-leaved Palma-Chrifti. Linn.

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9. *R. globofus*. Globular Palma-Chrifti. Willd. n. 9. (Croton globofum; Swartz Ind. Occ. v. 2. 1181.)—Leaves ovate, obtufe, entire. Flowers dioecious. Capfules globular.—Native of lofty mountains in Jamaica. *A branched, erect shrub*, four or five feet high. *Branches* round, ftriated, afh-coloured. *Leaves* alternate, ftalked, coriaceous. *Flowers* in terminal, fhort, erect clufters. *Capfule* roundifh, the fize of a pea.

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Alfo the green-ftalked American palma-Chrifti, which has a thick herbaceous ftem, of a greyifh-green, with the joints not fo far afunder as in the preceding fort: it rifes about four feet high, and is divided at the top into three or four branches, which fpread out almoft horizontally; the leaves are large, of a deep green on their upper fide, but greyifh on their under; they are deeply cut into fix or feven (fometimes eight) lanceolate fegments, which are unequally ferrate: the petioles fpread out more horizontally than thofe of the common fort, and are much fhorter: the principal ftalk and branches are terminated with loofe fpikes of flowers; the covers of the capfules are green, and clofely armed with foft fpines; the feeds are fmallier and lighter coloured than thofe of the preceding fort. This is alfo a native of the Weft Indies.

Likewife the wrinkled-capfuled palma-Chrifti, which rifes with an herbaceous ftalk about four feet high; the lower part is purplifh, and the upper deep green, the joints pretty far afunder; the leaves are of a deep green on their upper fide, but paler underneath; they are not fo deeply divided as fome of the others, and arc more regularly ferrate; the fpikes of flowers are large; the males have more ftamens, with yellow anthers; the capfules are oval and wrinkled,

but have no prickles; the seeds are small and brown. This is a native of both the Indies.

Farther, the red-stalked palma-Christi, which rises with a large reddish stalk to the height of ten or twelve feet, with many joints, and dividing into several branches; the leaves are very large, some measuring more than two feet and a half in diameter; are of a dark green, unequally serrate, and not so deeply cut as in some of the varieties; the spikes of flowers are large, and brown, with whitish anthers; capsules large, oval, and closely set with soft prickles; the seeds are very large, and beautifully striped. This sort is a native of Africa and both the Indies.

And the small American palma-Christi, of which there are two sub-varieties, one with a red, the other with a pale-green stalk, distinguished in America by the names of red and white oil-seed; the stem seldom rises more than three feet high, sometimes dividing at the top into two or three branches; the leaves are much smaller and more deeply divided than in the other varieties; their borders are unequally serrate, and the segments of the leaves are frequently cut on the sides; the spikes of flowers are smaller and more compact; the capsules are also smaller, rounder, of a light green, and closely set with soft prickles; the seeds small, and finely striped. This is a native of Carolina, and some other places.

Lastly, the livid leaved palma-Christi, which is an ever-green tree, ten feet in height, and more; the trunk, during the first year, is blood-red and very shining; afterwards it becomes woody, as thick as the wrist, hollow with transverse septa, pithy, with circular warts at the joints from fallen stipulas, ash-coloured, interruptedly and slightly streaked; before the leaves come out, they are wrapped up in red stipulas like sheaths, that fall off soon after; the leaves are divided half way into eight, sometimes ten lobes, which are serrate and acute, and the petiole is long; they are of a dark blood-red colour on the upper surface, and livid on the lower, with blood-red veins, the largest less than a foot in diameter, quite smooth, without any hairiness whatever; the fruit of a livid colour, with long soft prickles; the seed shining, variegated with black and brown. This is a native of the East Indies.

Method of Culture.—All these sorts of plants are capable of being increased by seeds, which should be sown upon a hot-bed in the spring, and when the plants are come up, be each planted into a separate pot filled with light fresh earth, and plunged into a fresh hot-bed, watering and shading them until they have taken root; after which they must have a great share of free air when the season is mild, otherwise they draw up tall and weak. As the plants grow fast, and their roots in a short time fill the pots, they should be shifted into larger pots, filled as above; and about the end of May, when the season is warm, be hardened to endure the open air by degrees; when, if some of the plants be shaken out of the pots, and planted out into a very rich border, and in dry weather duly watered, they grow to a large size, and produce a great quantity of flowers and seeds. If it be intended to preserve any of the plants through the winter, they must not be planted out in the full ground, but be shifted into larger pots occasionally, as their roots require, placing them in the open air during the summer season in some warm situation, where they may remain until October, when they must be removed into the green-house with other exotic plants, watering them sparingly in winter, and admitting free air in mild weather, as they only require to be protected from frost and cold winds.

In common, they have a fine ornamental effect in their leaves among other potted green-house plants, and also in

the large open border or clumps, when cultivated as annuals; but they require room.

RICINUS Communis, or common Palma-Christi, in the *Materia Medica*. See *CASTOR OIL*.

RICITOSA, in *Geography*, a town of Moldavia; 20 miles W. of Birlet.

RICK, in *Rural Economy*, a term applied to a pile of corn, hay, straw, &c. regularly heaped up in the open air, and sheltered from wet by thatch. See *STACK*, and *STAND, Corn*.

RICK-Yard, a term sometimes given to that part of the farm-yard in which the stacks are placed. They should be sufficiently large, well sheltered from winds, and perfectly secured from all sorts of vermin, especially rats and mice.

RICKBAD, in *Geography*, a town of Hindoostan, in Oude; 20 miles N.W. of Lucknow.

RICKETS, in *Medicine*, a disease affecting children, and principally characterized by enlargement and flexure, or distortion of the bones.

The origin and etymology of this word are equally unknown. It has occurred in this, as in several other instances, that the vulgar had recognized and given a name to the disease, before medical men had discriminated its nature, or at least had taken the pains to point out its peculiarities by any written document. The first account of the disease is that of Dr. Glisson, published in the year 1650, which was the result of some communications on the subject in a private medical society. In this treatise we are informed, that the *ricketts* had first been noticed in the counties of Dorset and Somerset, about thirty years before, where it was vulgarly known by this name, and that it spread from thence over all the southern and western parts of the kingdom, but was not yet commonly known in the north. The rapidity of its progress, and the extent and fatality of its prevalence, are scarcely less extraordinary than its general and speedy disappearance in later times, as no assignable cause has ever been pointed out either for its origin or its cessation. Its first appearance, as a cause of death, in the bills of mortality of London, was in the year 1634, when the total number of deaths under this head was only 14; but an extraordinary increase soon took place. For, in 1649, the deaths from ricketts amounted to 190; in 1650, to 260; in the following year, to 329; and in 1660, 521 persons died of this disease. At the commencement of the 18th century, the mortality from this disorder was 393 (A. D. 1700); and it subsequently decreased rapidly; for in the year 1750, the number of deaths, recorded in the bills under the head of ricketts, is only 21; and at the end of the century (1799), the deaths, under the head of "evil and ricketts" conjoined, do not exceed 7. (See *Ann. Medical Register*, vol. i. for 1808, p. 324.) At present, indeed, the disease is almost unknown to medical practitioners, except by name.

With the view of accommodating a classical name both to the vulgar appellation and to the symptoms of the disease, Glisson invented the term *rachitis*, *ραχιτις*, i. e. *spinal disease*; since the curvature of the spine, which ensues, is one of the most prominent symptoms. This appellation has been adopted by the nosologists, and all subsequent writers, who have used a Latin nomenclature. (See Glisson, de *Rachitide*, cap. i.) Whether the disease was really unknown, or did not exist, until modern times, is a question which it would be very unprofitable to discuss; since there are few satisfactory documents to be found on the subject. We shall therefore proceed to deliver a history of the symptoms.

This disease seldom commences before the ninth month, and rarely after the second year, of a child's age; but it may

RICKETS.

may appear at any interval between these two periods. Its progress is at first usually very slow. The early appearances of its approach are a flaccidity of the muscular flesh, and a certain degree of emaciation of the body, notwithstanding that the appetite for food is rather increased than impaired; together with a paleness and loss of colour in the complexion, and a slight degree of fulness, or tumefaction in the face. The head at the same time appears large with respect to the body, and the fontanelle, and even the sutures of the skull, are more open than is usual in children of the same age. The head continuing to increase in size, the forehead especially, becomes unusually prominent, and the neck appears very slender in proportion to the head. The progress of dentition is also slow, or much later than usual; and those teeth which protrude themselves soon become black, decay, and often fall out. Their ribs lose their convexity, and become flattened at their sides, while the sternum, or breast-bone, is pushed forward, so as to form a sort of ridge. At the same time, or sometimes sooner, the epiphyses at the several joints of the limbs become swelled, while the limbs between the joints appear, or perhaps actually become, more slender. The bones now are obviously every where, to a certain degree, flexible, becoming variously bent and distorted, and especially the legs and the spine of the back are incurved in various directions. If the child had already acquired the power of walking before the commencement of the disease, it becomes daily more feeble in its motions, and more averse to exertion, and at length loses the power of walking altogether.

While these symptoms go on increasing, the abdomen always appears preternaturally full and tumid, and the stools are generally frequent and loose; yet the appetite often remains good. The faculties of the mind often exhibit a premature advancement, and the power of speech is early acquired; but in some cases the understanding is impaired, and stupidity or actual fatuity ensues. There is usually no febrile affection accompanying the disease at its commencement; but it seldom continues long before the pulse becomes frequent, and other symptoms of fever ensue.

With these symptoms the disease proceeds, and continues in some instances for several years; but, in many cases, in various stages of that progress, it ceases to advance, and the child gradually recovers its health and strength, except that the distortion of the limbs, produced by the disease, continues during the remainder of life. In other cases, however, the malady proceeds, continually increasing, until it has affected almost every function of the animal economy, by the derangement of the viscera and the impediment to their operations, which the distortion of the bones occasions. The most material danger and distress thus produced arise from the distortion of the spine, ribs, and sternum, by which the cavity of the chest is greatly diminished, and the action of the lungs and of the heart much impeded, or altogether arrested. The functions of the liver, stomach, &c. and those of the uterus and bladder, under distortions of the pelvis, are thus also often rendered morbid and distressful for the rest of life. When the head, too, is greatly enlarged, the existence of water is to be apprehended. It is unnecessary to enter into any detail of all the variety of symptoms, which are the secondary effect of these impediments to the action of particular organs; since relief is not to be obtained effectually while the mechanical impediment exists incurably, and the origin of each particular symptom will be easily explained from the circumstances of each case. The organs themselves, however, become seriously deranged under this state of pres-

sure and obstructions; and morbid conditions have been discovered in various parts internally in the bodies of those who have died. Thus, most of the viscera of the abdomen, the liver, spleen, and mesenteric glands, have been found to be preternaturally enlarged; the lungs have been found in a morbid state, apparently from some inflammation that had come on towards the termination of the disease. The brain has been commonly found in a flaccid state, with effusions of a serous fluid into its cavities. The bones very universally have been commonly found in a flaccid state, with effusions of a serous fluid into their cavities. The bones very universally have been found to be soft, so much so indeed, as to be readily cut by a knife; and the muscular parts also soft and tender, the whole of the dead body being without that degree of rigidity which is so common in almost all others. Cullen, First Lines, par. 1724.

The great peculiarity, then, of this disease, appears to consist in a deficiency of that matter which forms the solid parts of the body, especially of the bones, or in a faulty state of the process of ossification, by which that matter is deposited in the membranes and substances destined to become bony, to give them their due firmness, hardness, and strength. There is obviously a defect in the quantity of this matter, the place of which is supplied, especially about the epiphyses of the bones, by a soft substance which increases their bulk. What this deficiency of ossific matter depends upon, it is difficult to ascertain: it may originate either in the faulty action of the organs of digestion and assimilation, by which the nutritive fluids are prevented from being properly prepared; or from a fault in the organs of secretion and nutrition, which prevents the proper elaboration of the circulating fluids. Of the nature of this latter process, however, we are totally ignorant; and practitioners have more generally referred to the former, and ascribed the disease to the actual deficiency of bony matter in the circulating fluids, as furnished by the digestive organs: yet they have been generally also compelled to refer this deficiency to some general laxity or debility of the system. But admitting the existence of such a debility, it is altogether impossible to account for its operation in diminishing the ossific matter, being limited to the early portion of childhood; for though a *mollities ossium*, or softness and flexibility of the bones, has occurred in adult life, it is a circumstance of extreme rarity. In a word, the essential nature of the disease is beyond our investigation.

Causes of Rickets.—Neither are the causes of the disease very clearly demonstrated. Great stress was laid by the earlier writers upon the *hereditary* predisposition which descended from parents to their children; but the very rapid increase of the disease among children, soon after the disorder was first noticed, and therefore the necessary primary origin of it in many whose parents must have been free from the taint, renders the opinion untenable. Indeed the rise, prevalence, and disappearance of the disease, during a certain period of time, including about a century and a half, would seem to connect its existence with some more general cause; but no one has been able to point out any peculiar physical condition of the people of England, during that period, to which such a malady can be attributed. Some have imputed it to the multiplication of manufactures and other unwholesome occupations; but the manufactures continue while the disease has nearly vanished. It is certain, however, that in later times the disease has been principally known among the children of the poor, living in close and uncleanly situations, and in dirty ill-ventilated apartments; and especially among those children who are ill-nursed, that is, in whom constant washing and proper exercise,

exercise, as well as good feeding, have not been attended to. Damp air, and residence in a cold and humid situation, have also been enumerated among the predisposing causes of rickets; and in this respect, as well as in the practice of better modes of management in infancy, the change of circumstances in the present state of great towns, and even in the habitations of the peasantry, when compared with those of the preceding century, will be deemed sufficient at least to have greatly diminished the general sources of infantile disease and mortality. See HEALTH.

Cure of Rickets.—Observation of the circumstances under which the rickets occurred, as well as of those with which it was accompanied, suggested the only means that were resorted to for the cure of this disease, until modern chemistry proposed the administration of a substitute for the deficient ossific matter; a proposal, however, which does not appear to have led to the advantages which were anticipated. The method suggested from observation of the circumstances just alluded to, was rather of a preventive than of a curative nature; and turned upon the plan of invigorating the constitution of the infant from the period of its birth. This is to be accomplished by remedies which may improve the tone of the stomach in particular, and through that medium of the system at large, or by those which operate directly upon the latter. Of these general tonic remedies, the *cold bath* seems to have been commonly found to be the most effectual, at least as a preventive of the disease. Since it became a general custom in this country, through the recommendation of medical men, to wash young children with cold or tepid water daily, the rickets seem to have been less and less prevalent. Indeed Dr. Cullen declared long ago, that he had never met with the rickets where this practice was adopted; and that where the disease had already begun, this remedy often checked the progress of the disease, and sometimes cured it entirely.

With the same view internal medicines of a tonic quality have been generally prescribed, to remove or arrest the disease; and among these, the preparations of *iron* have been most frequently employed. A preparation of this kind was long ago recommended by Mr. Boyle, and universally adopted, under the appellation of *ens veneris*, which, notwithstanding its name, was iron. The rust of iron, and other preparations, as well as those of zinc, have been also used for the cure of rickets, in preference to the Peruvian bark, on account of the difficulty of administering this substance to infants in any useful quantity; De Haen, however, has borne testimony to the efficacy of the latter.

Much is also to be done by good nursing; that is, by a proper regulation of the exercise, diet, and clothing, by all of which the healthy performance of the functions of an infant is greatly assisted. Exercise, indeed, even in the only form in which young children can enjoy it, *viz.* that of gestation, is one of the most powerful general tonics; and even friction with dry flannels would probably contribute to the same end. The diet of children is now reduced to a much more rational standard than during the last century, and the proper mode of administering it is now too well understood to require any minute instructions in this place. (See INFANTS.) The supposition of the pernicious acidity, arising from the use of that most natural food milk, to which Zeviani and some other writers ascribed the origin of the disease, is altogether without foundation.

It is highly proper, also, where there is a ricketty tendency present, to attend to the symptoms which accompany its approach, and to correct any influence which these symptoms may have upon the general health. Above all, it is advisable to administer remedies against the derangements of

the abdominal viscera, connected with tumid abdomen and irregularity of bowels, which so commonly attend that disposition. For this purpose the testaceous powders, combined with small doses of some mercurial alterative, or with rhubarb, or the latter united with steel and soda, may be prescribed with benefit. The use of emetics, which was resorted to by some practitioners, appears to be of no beneficial tendency, unless they may act on the bowels as laxatives; and a system of active purging, which was also generally employed, as it contributes to much debility, should be avoided.

It remains only to mention the chemical proposal, which M. Bonhomme of Paris proposed, of administering the component parts of bone in the way of medicine, upon the supposition that the disease depends upon the mere deficiency of these substances in the circulating blood. M. Bonhomme therefore suggested the administration of phosphate of lime and phosphate of soda in substance; and formed a powder, consisting of equal parts of these substances, of which he gave a scruple twice a day to infants. He contends that the calcareous phosphate, when taken internally, is really transmuted by the lymphatic vessels, and is applied to the purposes of ossification, and that this administration of it powerfully contributes to restore the natural proportions in the substance of the bones, and thus accelerates the cure of rickets. In support of these opinions, he relates various experiments made on young fowls, to which it was given mixed with their food, and in which, he maintains, the progress of ossification was accelerated, in comparison with others to which it was not given. (See his Memoir on Rachitis; and Duncan's Annals of Medicine for 1797.) These physiological experiments, however, lead to no legitimate deductions as to the operations of disease in the human body; and, experience in the latter has not apparently supported the doctrines of M. Bonhomme.

RICKETS is also a disease affecting sheep, as well as some sorts of vegetable crops.

RICKETY GRAIN, in *Agriculture*, a sort of vegetable disorder that often attacks wheat crops. It is, according to Dr. Anderson, a kind of disease which is totally different from that of *smut* or *rust*. The grain affected with this disease assumes a small shrivelled appearance, and irregular form; its colour is somewhat darker than good wheat of the same kind, but is different from that which is affected with either of the two other diseases. Water, when poured upon wheat of this kind, soon, he observes, moistens it, and brings to life a number of eel-shaped animals in various stages of their growth, which had taken up their residence there while the grain was yet in its succulent state, and thus occasioned the disease which produced the alteration in its form. As the grain ripens and dries, these animalcules are arrested in their progress, their life totally suspended, and their destructive operations upon the corn of course obstructed, so long as it remains in this dry state. But no sooner does this grain become soft, in consequence of being moistened with water (whether after being sown in the ground or otherwise), than these creatures are restored to life and activity; they soon begin to feed upon the grain while it is moist, and, if not interrupted in their progress by another desiccation, quickly lay their eggs (for they are oviparous), and go through the ordinary evolutions of nature. The young, when hatched in the corn that was sowed, after living upon it for some time, begin, he asserts, to eat their way up the growing stalk, and establish themselves at length in the grain itself, while it is advancing towards maturity, where they are arrested in their progress in the manner above described when it is fully ripened.

And in respect to the nature of the animalcule that produces these effects, it is remarked, that it can be preserved alive in a quiescent dried state, for twenty-eight years at least, as has been shewn by experiment, after the lapse of which period it was found to revive as readily as if its vital functions had been thus suspended only for one day. It is further stated as worthy of remark, that the eggs of this creature cannot be preserved for a length of time in a dry state, and still retain their prolificacy, neither can those among them which are very young, or those which have attained their full size, be revived after they have been dried up. It is only those individuals that are in the full vigour of life, and in a state soon to produce young, that are endowed with this singular faculty. In this case, the obvious intention of nature is to preserve the species, by keeping them in life until the grain shall be sown, and thus to have a proper food provided for their progeny, however long that may be.

RICKMAN, GEORGE WILLIAM, in *Biography*, a member of the Imperial Academy of Sciences at Petersburg, was born at Pernaau in 1711, after the decease of his father, who was treasurer to the king of Sweden. Having acquired the rudiments of a good education in the gymnasium at Revel, he prosecuted his studies at the universities of Halle and Jena, but applied chiefly to mathematics and natural philosophy, to which he shewed a particular attachment. In the year 1735 he was made a member of the Imperial Academy of Sciences; in 1741 he became extraordinary professor, and in 1745 he was elected ordinary professor of experimental philosophy. He was from this period particularly attached to the new science of electricity, and applied himself particularly to atmospheric electricity. On the discoveries made in this branch of knowledge he had composed a treatise, which he intended to read on the 6th of September 1753, at a public meeting of the Academy; and in order to demonstrate what he might advance in the discourse, he made a great number of experiments on divers thunder clouds. In one of these the professor was struck dead by a flash of lightning, drawn by his apparatus into his room. Of this fatal accident there are two accounts in the *Transactions of the Royal Society*.

The professor had provided himself with a gnomon, an instrument to measure the strength of the electricity of the passing clouds. He was, on the 6th of August, N.S. 1753, a little before noon, at the Academy, when it thundered at a considerable distance, the sky being then clear and the sun shining bright. In the hope of confirming his former observations, or of making some new ones, he hurried home, accompanied by Solokow an engraver, that the latter might make himself master of the leading circumstances of the electrical experiments, in order to be the better enabled to represent it on a copper plate, which was to be annexed to his dissertation. The philosopher led the engraver to his apparatus, but while examining for his own use, or perhaps describing the effect of the electricity on the gnomon to his friend, with his head inclined towards it, he received a violent shock, which instantly deprived him of existence. M. Solokow observed, he said, a globe of blue fire, as big as his fist, jump from the rod of the gnomon towards the head of the professor, which was at the instant about a foot from the rod. This flash killed M. Rickman, but M. Solokow could give no account of the particular manner in which he was immediately affected by it; for, at the same time that the professor was struck, there arose a sort of steam, or vapour, which entirely benumbed him, and made him sink to the ground, so that he did not even remember to have heard the clap of thunder, which was very loud. The globe of

fire was, however, attended with a report as loud as that of a pistol: a wire, which brought the electricity to his metal rod, was broken in pieces, and its fragments thrown upon M. Solokow's clothes. Upon examining the effects of the lightning in the room, it was found that the door-case was half split through, and the door torn off and thrown into the room. An attempt was made to bleed the breathless body, but no blood followed. The shoe belonging to the left foot was burst open, and uncovering the foot at that place, they found a blue mark, from which it was inferred that the electrical fluid, having entered the head, made its way out again at the foot.

Upon the body were several red and blue spots, but the hair of the head was not singed. The stocking was entire though the shoe was ripped up; the coat was uninjured though the waistcoat was much singed; and there appeared on the back of M. Solokow's coat long narrow streaks, as if red-hot wires had burnt off the nap. On opening the body the cranium was entire, and the brain perfect, but the transparent pellicles of the windpipe were excessively tender, gave way, and were easily rent. There was some extravasated blood in it, as likewise in the cavities below the lungs; those of the breast being quite found, but those towards the back were of a brownish colour, and filled with more of the above-mentioned blood: otherwise none of the entrails were touched, but the throat, the glands, and the thin intestines, were all inflamed. After two days the body was in such a state of putrefaction that it was with difficulty got into a coffin. *Phil. Trans.* vol. xlix. pt. 1. Priestley on Electricity.

RICKMANSWORTH, or RICKMERESWORTH, in *Geography*, a small market-town in the hundred of Cashio and county of Hertford, England, occupies a low, moorish situation near the confluence of the rivers Gade and Colne, at the distance of 19 miles N.W. from London. The manor was an ancient demesne of the Saxon kings, and was given by king Offa to the abbey of St. Alban's, to which it was confirmed by succeeding monarchs, and had the charter of a weekly market and two annual fairs granted by Henry III. The church is a spacious edifice, consisting of a nave, aisles, and chancel: it was repaired in the year 1677, and again in 1802: the large gallery at the west end was probably erected about the former period. Previous to the late repairs, a large altar-tomb, in memory of Henry Cary, baron of Leppington and earl of Monmouth, stood against the south wall of the chancel; but being supposed to disfigure the place, it was removed; and a memorial slab of black marble, which was affixed to the tomb, was let into the south wall, with sculptures in white marble of the family arms. Against the north wall is a mural monument, to commemorate fir Thomas Fotherly (gentleman of the privy chamber to Charles I.), and his son and grandson. Several others of the family are recorded on a slab on the floor. In the east part of the south aisle are three large altar-tombs, in which are deposited the remains of the families of Colte, Salter, and Whitfield, inhabitants of this town. In the north aisle a neat mural monument records the memory of Timothy Earle, esq. of Moor-house, who died in May 1787, aged 80; and also of Dorothy his wife. A marble tablet against the north wall commemorates admiral William Bladwell, formerly of Money-hill in this parish, who died in March 1783, at the age of 80.

Rickmanworth, by the vicinity of several streams, is rendered very convenient for trades that require the assistance of water: several mills have consequently been erected for various purposes in its neighbourhood: a large cotton and flour-mill at the south entrance to the town; one for flock and

and silk at a small distance to the west; and several for paper, &c. towards the north, on the rivulet that flows from Chesham. Additional employment, particularly for females, is derived from the manufacture of straw-plat. The market was formerly distinguished for its corn trade, but is now little frequented, though toll free: the market-house is a mean wooden structure, raised on pillars, and open beneath. The population, as ascertained under the act of 1811, was 3230, the number of houses 589.

The manor of the Moor in Rickmanworth parish, being anciently parcel of the possessions of St. Alban's abbey, was, about the year 1431, with other contiguous manors, held under that foundation by a tenant named Flete, who had for several years refused either to pay the quit-rent, or to perform the covenanted services claimed by the abbot; one of which was finding for his use, and that of his successors, "one nag-horse to carry him to Tynemouth, whenever he or they should visit that cell:" the dispute was at length decided in favour of the abbot by sir William Babyngton, chief justice of the common pleas; and Flete was compelled to the observance of the accustomed homage and fealty. The next possessor on record was Ralph de Boteler, lord of Sudely in Gloucestershire. It is now held by Robert Williams, esq. banker of London.

Moor-Park house, the splendid residence of this gentleman, is a magnificent building of the Corinthian order, standing in a finely wooded park about five miles in circumference, and having two fronts, respectively facing towards the north and south. The height of the ground to the south contracts the view; but the northern front commands an extensive prospect; the hill, which had previously obstructed the sight, having been lowered about the year 1725, at the expence of 5000*l.* This was effected by B. H. Styles, esq. to whom the present mansion is indebted for its chief grandeur, as he new casted and fronted it with Portland stone; and having built the magnificent portico, erected two wings for the chapel and offices, and connected them with the centre by colonnades of the Tuscan order. The charge of the carriage of the stone from London, amounted to upwards of 15,000*l.*, and the entire expence, including the improvements in the park, was more than 150,000*l.* Beauties of England and Wales, vol. vii. by E. W. Brayley.

RICKSGÖLD, in *Commerce*, one of the two species of paper currency in Sweden, the other being *banco*. The latter is issued by the national bank, and the former by the Ricksgöld bank, which is under the direction of government. Banco is 50 *per cent.* better than Ricksgöld; that is, two dollars of the former are worth three dollars of the latter. Banco is a legal tender, and has lately been declared, by royal authority, the national currency. Ricksgöld is current in all payments; but as no fresh issues of this paper have been lately made by government, it is continually decreasing in circulation, while *banco* increases. Both currencies are made payable to bearer on demand, and are accordingly discharged when presented for payment.

RICLA, in *Geography*, a town of Spain, in Aragon, on the Xiloca, anciently called "Nertobriga;" 14 miles N.E. of Calatayud.

RI-COCHET BATTERY, in *Fortification*. See BATTERY à *Ricochet*.

RI-COCHET *Firing*, in the *Military Art*, is a method of firing with pieces elevated from three to six degrees, and loaded with a small charge, so that the ball may bound and roll along the inside of the parapet. The ball or shot, thus discharged, goes rolling and bounding, killing, maiming, or destroying all it meets with in its course, and creates much

greater disorder, by moving thus slowly, than if thrown from the piece, whose elevation is greater, with greater violence.

The word *ricoché* signifies *duck and drake*, terms applied to the bounding of a flat stone thrown almost horizontally into the water.

RICOTE, in *Geography*, a town of Spain, in the province of Murcia; 20 miles N.W. of Murcia.

RICOTIA, in *Botany*, a Linnæan name whose origin no one has been able to explain, nor can we throw any light upon it. It has the appearance of a proper name, and was probably given in honour of some obscure botanist.—Linn. Gen. 337. Schreb. 440. Willd. Sp. Pl. v. 3. 477. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 98. Juss. 239. Lamarck Dict. v. 6. 210. Illustr. t. 561. Gærtn. t. 142.—Class and order, *Tetradynamia Siliquosa*. (*Silicula*; Brown.) Nat. Ord. *Siliquosa*, Linn. *Crucifera*, Juss.

Gen. Ch. *Cal.* Perianth inferior, deciduous, of four, oblong leaves, approximating in a parallel manner. *Cor.* cruciform, of four, obcordate petals, spreading. *Stam.* Filaments six; four the length of the tube; two somewhat shorter; anthers oblong, acute. *Pist.* Germen superior, cylindrical, the length of the stamens; style scarcely any; stigma acute. *Peric.* Pod sessile, lanceolate-oval, with one or two cells, and two flat valves. *Seeds* mostly four, orbiculate, compressed.

Eff. Ch. Pod of one cell, oblong, compressed: valves flat.

1. *R. ægyptiaca*. Egyptian Ricotia. Linn. Sp. Pl. 912. (*Lunaria foliis supradecompositis; foliolis trifidis, siliquis oblongis pendulis; Mill. Ic. v. 2. 113. t. 169.*)—Native of Egypt, flowering in June and July.—*Root* annual. *Stem* a foot high, smooth and branching. *Leaves* unequally pinnate; leaflets various, some undivided, others three-lobed, of a lucid green. *Flowers* purple, on long stalks, at the sides and ends of the branches, in small, loose clusters. *Pods* drooping, when ripe of a pale brown colour.

This genus is very nearly allied to *Lunaria*, from which indeed it chiefly differs in having a sessile, not stalked, pod.

RICZIWOL, in *Geography*, a town of the duchy of Warfaw; 30 miles N. of Posen.

RIDA, a town of the Valais; 4 miles S.E. of Sion.—Also, a town of Sweden, in the province of Upland; 24 miles N.E. of Stockholm.

RIDALE, or RISEDALE, a river of England, in the county of York, which runs into the Swale, near Richmond.

RIDAL-HEAD, a mountain of England, in Cumberland; 2 miles N. of Ambleside.

RIDDERHUDE, a town of the duchy of Bremen; 8 miles N. of Bremen.

RIDDLE. See ÆNIGMA.

RIDDLE, in *Rural Economy*, a sort of sieve used to separate dust and the seeds of plants from corn. They are made of different forms and sizes, for different uses.

RIDE of hazle, or other wood, is a group or cluster of sprigs shooting out of the same root or stock.

RIDE, or *Riding*, in the *Manege*. To ride signifies to learn to ride. Thus, he rides under a good master. For an account of the origin and history of the art of riding, we refer to the article HORSE.

In addition to the observations which occur under that article, in proof of the antiquity of the art of riding, we shall here introduce some other considerations, which tend to evince the priority of riding to the use of chariots. Egypt appears to have been the spot in which the horse seems to have been first subdued and disciplined by man; and

and it is evident from the Mosaic history, that in the first instance where mention is made of Pharaoh's chariots, he is likewise said to have had his horseman: which word, in the Hebrew language, is explained by the commentators to mean one who sits upon and guides a horse. Besides, the Hebrew word, "parash," horseman, is derived, as Buxtorf says, from a Hebrew root, which signifies to *prick* or *spur*; and the rider, or spurrier, was so denominated, because he used to prick or spur the horse. Aben-Ezra says, that the horseman was so called from wearing spurs on his heels. By this account and explanation of the word, which in the Hebrew signifies a "horseman," we are informed of the great antiquity of spurs; and may reasonably conclude, that the art of riding was not only known, but, from the invention of spurs, had also received an improvement, not unworthy of the discovery of more discerning times; and seems to imply, that riding was not only familiar, but even advanced in those primitive times to a degree of exactness, perhaps, not hitherto suspected. The arguments here, and also under the article HORSE, alleged in proof of the seniority of horsemanship to that of the use of chariots, may be strengthened by the following passage in the book of Job, where, speaking of the ostrich, he says, "she lifteth herself on high, she scorneth the horse and its rider;" which expression seems to imply that it was a custom, as it is now in some nations, to hunt this bird on horseback, and that she was superior to the swiftest horse. Hence it must be granted that riding was practised in his country, and at the time in which he lived; nor is it to be forgotten, that he lived in a country distinguished above others for its horses, and in which no chariot was ever known to have been used. We may also add to the same purpose, the noble description which he gives of the horse, so known and so admired, in which he speaks of him only as being rode, and not driven in a carriage: and if this writer, as some learned persons have thought, lived long before the time of Moses, what he says in relation to this subject must be anterior to the Mosaic history; and if that be the case, the antiquity of equitation will be carried so high, as to put it beyond the reach of inquiry and investigation. In the description just referred to, the English translators make Job say, "that this animal's neck is clothed with *thunder*;" an expression no less false than absurd. The true rendering of this passage is, that his neck is clothed with a *mane*. Thus Bochart, Le Clerc, Patrick, and other commentators translate it. Bochart says, that the word, which in Hebrew signifies *thunder*, is synonymous with that for the *mane* of the horse; but this being the case, it is astonishing that the translator should have set aside the just and natural signification, and have chosen to cover the horse's neck with *thunder*, instead of a *mane*; nor is it less amazing, that this nonsense should have been extolled by the author of the "Guardian," and others, as an instance of the sublime. We shall here observe, that the Grecians, in many instances, chose mares for riding before horses. Ælian says, they thought them fitter for the course; and Virgil only names the mares of Epirus, as running in the Olympian race. Pliny says, they were swifter than horses. Berenger's Hist. and Art of Horsemanship, vol. i. p. 12, &c.

The knowledge and utility of the art of riding consist in being able to discern, and dextrous to employ, the means by which the horse may be brought to execute what the rider requires of him, with propriety, readiness, and safety: and this knowledge in the man, and obedience in the horse, should be so intimately connected, as to form one perfect whole; this union being so indispensably necessary, that, where it is not, there is no meaning between the man and

horse: they talk different languages, and all is confusion.

The Greeks, who excelled in the art of riding, were accustomed to mount and dismount, by vaulting and leaping from and upon the backs of their horses, as well as from one horse to another. These feats of activity seem to have been first practised in battle, and in those ages when saddles, and consequently stirrups, were unknown. The utility of this method must be acknowledged; for if one horse was tired, wounded, or killed, his master had another for his service; two or three being led into the field, which were used as occasion required. These exercises, so essentially necessary in war, were, after a time, performed in the public games, and other occasional exhibitions, merely to shew the nimbleness and address of the horseman; and the modern art of vaulting, in all its variety of postures and methods, and which has now little more in view than to display the activity of the performer, is, without doubt, derived from this ancient practice; as well as the whole modern manege, except some few experiments, calculated merely for grace and pleasure, is borrowed from the different motions and evolutions performed by men and horses in battle. To this likewise we owe the solemnities and sports of tilts, tournaments, and jousts; invented as a mock-war, to fill up the lazy hours of peace, to inspire and keep alive a martial spirit, and to render the body active, robust, and expert in the feats of arms.

It is well known that the Romans were indebted to Greece for many arts and useful improvements, and particularly horsemanship, which was received and adopted by them with such eagerness, and cultivated with such diligence and zeal, that they soon were able to excel their masters. Romulus, at a very early period, instituted his order of "equites," or horsemen, as Athens and Sparta had done before, on purpose to encourage the practice of riding, and engage his new subjects to keep horses at their own expence, which, in those times, were so costly, that the rich alone were equal to the charge of maintaining them. Among the Romans they had a horse called "singularis," or single, upon which a man rode without a saddle, using only a cloth, like the Greeks, fastened with a surcingle, or else sitting upon the bare back. The riders were also, occasionally, tied and bound to their horses by these girths, that they might sit more firmly and securely; but the practice was imprudent and dangerous, as they were thus liable to be dragged and torn by the horse, in case they were defeated, like the warrior described by Silius Italicus (lib. 4. Punic.):

" ——— Rapiturque pavore
Tractus equi, vincis connexa ad cingula membris."

Lock saddles, now but little used, are liable to the same objection.

The art of riding subsists in various modes and different degrees of skill and perfection among different nations. In Arabia, where the horses are the finest and best of their kind, their owners manage them with singular dexterity. Their saddles have the back part, or "cattle," so high, that it reaches more than half-way up the rider's back. The stirrups are flat, in the Turkish manner, and contain the whole foot. They never use a girth, which makes it more difficult to mount and keep their seat. The Arabian youth understand the equilibrium, and keep their body in a just counterpoise; being so dextrous, that they will stand on the saddle, while the horse runs at full speed, sling their lances, turn round, throw themselves over, and stand upon their heads; the horse continuing his career all the time.

similar evolutions were practised by the ancient Romans. The Turks ride with their stirrups so short, that their knees are almost as much bent, as when they sit upon their hams upon a sofa. Their saddles are as large and unwieldy as a pack-saddle: they fasten and secure them upon the horse by a large girth, which passes over them, and prevents the saddles from turning, which their great weight would otherwise make them do. The bridles are generally gilt and ornamented, but otherwise very clumsy and ill-made. The Turks seldom use spurs, or carry a whip or switch; and yet they have an absolute command over their horses, and make them do whatever they please. In riding, they use only a stick, about three feet in length, and of the size of a large cane. This they hold by the middle, and strike the horse with it on his neck with either end, to direct and compel him to turn; making them run at full speed, and laying them out so rapidly, as almost to make their bellies touch the ground; the riders, at the same time, striking their darts into a turban, or tossing them in the air, riding after, and catching them before they fall to the ground. Others, especially the Arabs belonging to the sultan, will leap from one horse to another, running at their utmost speed. Others will creep under the belly, and up to the saddle again; others will turn two or three times round the horse's neck, and others will stand upright upon the saddle, and turn their faces to the tail, the horses all the time going at their utmost stretch.

The Persians have great personal address and activity on horseback. They play at "Mall" mounted on their horses, and strike the ball with certainty and surprising skill. They place also upon the top of a tree, or high pole, an apple, as a mark to shoot at with arrows. They set off at full speed, and when they are got beyond the mark, turn themselves round towards the croupe, draw their bows, and in this pace, and this attitude, seldom fail to hit the apple. The Tartars have, in all ages, been famous, under different names, for their love of horses, whose flesh they eat, drinking the milk of the mares, and skill in riding. It is a practice with them to tie the reins of their bridles to their girdles, and by the motion of their bodies alone to govern and direct their horses; pulling them into different attitudes, and making them perform a variety of evolutions. By this method they have their hands at liberty for the use of their weapons, which they manage with a skill surpassing that of other nations. Some will hold their bows in the same hand in which they hold their bridles, and at the same time draw the bow, and guide their horse with great address, always riding with their stirrups very short, in order to collect themselves better, and be able to rise up, as it were, when they are going to attack an enemy, and strike a blow.

The venerable Bede says, that the English began to use saddle-horses about the year 631, when prelates and others rode on horseback, who till that time were accustomed to go on foot; but that if, upon urgent occasions, they were obliged to ride, they used mares only, in token of their humility; the mare not being so full of pride or spirit as the horse. In the reign of Edward III. the horses called "Dextrarii," corresponding to those that are now termed *managed* horses, or horses *dressed* and disciplined for war, were held in the highest estimation, and appropriated to military exercises; and upon common occasions, persons of rank and consideration always rode upon horses of inferior degree, distinguished by the names of "Courseurs, Amblers, Palfreys, Hackneys, Nags, and Poneys," recommended by their easy paces and quiet temper. In several countries it was a custom, rigorously observed, that no knight of chivalry, or other gentleman, should ride upon a mare, it being

thought dishonourable and vile. The mares were always devoted to the cart, and all the ignoble services. The Spaniards, Turks, and some other nations, still adhere to this absurd notion, upon all occasions. The Dextrarii above-mentioned were called "magni equi," or great horses, being of the largest size, and intended to serve in war or for the exercise of the tournament; and as these great horses were required to be *dressed* or taught, that they might perform their tasks with readiness and fidelity; and as it is necessary that the rider should have knowledge and skill to guide his horse, those persons who professed the science of arms were obliged to learn the art of managing their horses, in conformity to certain rules and principles; and hence came the expression of learning to "ride the great horse."

After an ample review of the state of horses in England, Berenger takes occasion to distribute them into two general classes, which may be arranged under two distinct periods of time. In the first era, as it was an universal custom for horsemen to fight in armour, the burden was so heavy, and the service so severe, that none but *large* and *stout* horses were equal to the task. The practice of raising such a breed of horses began about the time of Henry II., or somewhat earlier, and continued till towards the end of the reign of Elizabeth. About the reign of James, armour, being rendered useless by the invention of fire-arms, was laid aside; and the *great* horse became useless, and, on many occasions, even improper. *Lighter* and more *nimble* horses were therefore brought into use, and here begins the era which comprehends the second class of horses, called the *light* or *swift* breed. This ingenious writer closes his review with observing, that, however highly gifted the horses may be, there are *duties* incumbent also upon those who are to ride them, without an attention to which all the talents of the horse, instead of being called forth and improved, will be crushed, extinguished, and nature have been kind in vain. These duties are comprehended under the "art of riding." This art has been, as this author regrets, so long neglected and despised, that one would be almost prompted to conclude that a fatality had constantly attended it in this country; favoured as it is with every advantage for breeding, nourishing, and procuring the finest horses of all sorts, and with a nobility and gentry, whose love of exercise, activity, courage, personal endowments, and commanding fortunes, would qualify them to take the lead, and "with the world with noble horsemanship;" yet, with all these high privileges, they have suffered it to languish, and almost perish in their hands; for a length of time it has been able to boast but of a very few persons who have stood forth as its avowed friends and protectors. The duke of Newcastle honoured it with his practice, and greatly enriched it with his knowledge. Sir Sidney Medows, sir William Hope, and the earl of Pembroke, are also mentioned with approbation and respect. Our author adds, that since the accession of his present majesty, the prospect has brightened, and better times begin to dawn. Since this happy event, the art has manifested signs of recovery; public riding houses have been opened, encouraged, and frequented; and the art has been so far protected and honoured by his majesty, that, as our author says, we may expect to see the golden age of horsemanship revive, and that men will no longer "complain of the want of excellent horses, nor the horses *groan* for want of worthy riders." This art has been much indebted to the publication of "The History and Art of Horsemanship," by Richard Berenger, esq., which has furnished various extracts, to be found under their appropriate titles, in our Cyclopædia. We shall here subjoin some particulars that

that have not elsewhere been introduced, and close the article with suitable references for the direction of the reader.

The posture of the body is an object of primary consideration in the art of riding. In reference to this object, the body may be divided into three parts, two of which are moveable, and the other immoveable. Of the two moveable parts, the first is the trunk or body, down to the waist; the second is from the knees to the feet; and the remaining immoveable part is that between the waist and the knees. The parts which ought to be without motion are the fork or twist of the horseman, and his thighs; and for this purpose, they ought to have a certain hold or centre upon which to rest, so that no motion of the horse may disturb or loosen them; this point or centre is the basis of the hold which the horseman has upon his horse, and is called the "seat;" and hence it must appear, that not only the grace, but the symmetry and true proportion of the whole attitude depends upon those parts of the body that are immoveable. Let the horseman then place himself at once upon his twist, sitting exactly in the middle of the saddle; let him support this posture in which the twist alone seems to sustain the weight of the whole body, by moderately leaning upon his buttock; let his thighs be turned inward, and rest flat upon the sides of the saddle; and in order to this, let the turn of the thighs proceed directly from the hips, and let him employ no force or strength to keep himself on the saddle, but trust to the weight of his body and thighs: this is the exact equilibrium: in this consists the firmness of the whole building, a firmness which young beginners are never sensible of at first, but which is to be acquired, and will always be attained, by exercise and practice. A moderate stress upon the buttocks is necessary, because a person that sits full upon them can never turn his thighs flat upon the saddle; and the thighs should always lie flat, because the fleshy part of the thigh, being insensible, the horseman would not otherwise be able to feel the motions of his horse; the turn of the thigh should be from the hip, because this turn can never be natural; but as it proceeds from the hollow of the hip-bone, the horseman never avails himself of the strength or help of his thighs, because, besides their being then less steady, the closer he pressed them to the saddle, the more would he be lifted above the saddle; and with respect to his buttock and thighs, he ought always to be in the middle of the saddle, and sit down full and close upon it. With regard to the position of the body or trunk, which is the first of the moveable parts, and which comprehends the head, the shoulders, the breast, the arms, the hands, the reins, and the waist of the horseman, we shall begin with the head. This should be free, firm, and easy, and thus prepared for all the natural motions which the horseman may make in turning it to one side or the other. The shoulders only influence, by their motions, that of the breast, the reins, and the waist. The horseman should prevent or advance his breast, by which his whole figure is opened and displayed; he should have a small hollow in his reins, and push his waist forwards to the pommel of the saddle, because this position corresponds, and unites him to all the motions of the horse. The mere throwing of the shoulders back produces all these effects in the degree that is requisite; whereas if we were to look for the particular position of each part separately, and by itself, without examining the connection subsisting between the motions of one part with those of another, there would be such a bending in the reins, that the horseman would be hollow-backed; and by forcing his breast forward and his waist towards the pommel of the saddle, he would be flung back, and must sit upon the rump of the horse. The

arms should be bent at the elbows, and the elbows should rest equally upon the hips. It is indeed the bridle-hand which ought to be steady and immoveable, and hence it might be concluded, that the left elbow only ought to rest upon the hip; but grace consists in the exact proportion and symmetry of all the parts of the body; and having the arm on one side raised and advanced, and the other kept down and close to the body, would present an awkward and disagreeable appearance. It is this which determines the situation of the hand which holds the whip, the left hand being of an equal height with the elbow; so that the knuckle of the little finger and the tip of the elbow be both in a line; this hand then being rounded neither too much nor too little, but so that the wrist may direct all its motions, the right hand, or the whip-hand, should be placed lower and more forward than the bridle hand. It should be lower than the other hand, because if it were on a level with it, it would restrain or obstruct its motions, and if it were higher, it could not take so great a compass as the bridle-hand, which must be always kept over-against the horseman's body; it is absolutely necessary to keep the proportion of the elbows, that it should be lower than the other. The second division of the moveable parts includes the legs and feet. The legs serve for two purposes; they may be used as aids or corrections to the animal; they should therefore be kept near the sides of the horse, and in a line with the rider's body; for being near that part of the horse's body where his feeling is most delicate, they are ready to perform their office at the moment when they are wanted. Besides, as they are an appendage to the thighs, if the thigh is upon its flat in the saddle, they will necessarily be turned just as they ought, and will infallibly give the same turn to the feet, because the feet depend upon them, as they depend upon the thighs. The toe should be held a little higher than the heel, for the lower the toe is, the nearer will the heel be to the sides of the horse, and must be in danger of touching his flank. Many persons, however, when they raise their toe, bend and twist their ankle, as if they were lame in that part. The reason is plain; it is because they make use of the muscles in their legs and thighs, whereas they should employ only the joint of the foot for this purpose; a joint given by nature to facilitate all the motions of the foot, and to enable it to turn to the right or left, upwards or downwards. Such, according to Mr. Berenger, is the mechanical disposition of all the parts of the horseman's body.

The hand, in horsemanship, admits of five different positions, in order to guide and govern the motions of a horse. The first is that general position from which proceed, and indeed ought to proceed, the other four.

Hold your hand three fingers breadth from your body, as high as your elbow, in such a manner that the joint of your little finger be upon a right line with the tip of the elbow; let your wrist be sufficiently rounded, so that your knuckles may be kept directly above the neck of your horse; let your nails be exactly opposite your body, the little finger nearer to it than the others, your thumb quite flat upon the reins, which you must separate by putting your little finger between them, the right rein lying upon it: this is the first and general position.

Does your horse go forwards, or, rather, would you have him go forwards? Yield to him your hand, and, for that purpose turn your nails downwards, in such a manner as to bring your thumb near your body; remove your little finger from it, and bring it into the place where your knuckles were in the first position, keeping your nail directly above your horse's neck: this is the second.

Would you make your horse go backwards? quit the first position; let your wrist be quite round; let your thumb be in the place of the little finger in the second position, and the little finger in that of the thumb; turn your nails quite upwards, and towards your face, and your knuckles will be towards your horse's neck. This is the third.

Would you turn your horse to the right? leave the first position, carry your nails to the right, turning your hand upside down, in such a manner, that your thumb be carried out to the left, and the little fingers brought in to the right. This is the fourth position.

Lastly, would you turn to the left? quit again the first position; carry the back of your hand a little to the left, so that the knuckles come under a little, that your thumb may incline to the right, and the little finger to the left. This makes the fifth position.

These different positions, however, alone are not sufficient; we must be able to pass from one to another with readiness and order.

Three qualities are essentially necessary to the hand. It ought to be firm, gentle, and light. We call that a firm or steady hand, whose feeling corresponds exactly with the feeling in the horse's mouth, and which consists in a certain degree of steadiness, constituting that just correspondence between the hand and the horse's mouth, which every horseman wishes to find.

An easy or gentle hand is that which, by relaxing a little of its strength and firmness, eases and mitigates the degree of feeling between the hand and horse's mouth, which we have already described.

Lastly, a light hand is that which lessens still more the feeling between the rider's hand and the horse's mouth, which was before moderated by the gentle hand.

The hand, therefore, with respect to these properties, must operate in part, and within certain degrees, and depends upon being more or less felt or yielded to the horse, or withheld.

It should be a rule with every horseman not to pass, at once, from one extreme to another, from a firm hand to a slack one; so that in the motions of the hand you must, upon no account, jump over that degree of sensation which constitutes the easy or gentle hand. Were you at once to go from a firm hand to a slack one, you would then entirely abandon your horse, you would surprise him, deprive him of the support he trusted to, and precipitate him on his shoulders, supposing you do this at an improper time. On the contrary, were you to pass from the slack to the tight rein, all at once, you must jerk your hand, and give a violent shock to the horse's mouth; which rough and irregular motions would be sufficient to falsify the firmest appui, and ruin a good mouth.

It is indispensably necessary, therefore, that all its operations should be gentle and light; and, in order to this, it is necessary that the wrist alone should direct and govern all its motions, by turning and steering it, if we may so say, through every motion that it is to make.

In consequence, then, of these principles, we insist that the wrist be kept so round that your knuckles may be always directly above the horse's neck, and that your thumb be always kept flat upon the reins. In reality, were your wrist to be more or less rounded than in the degree we have fixed, you could never work with your hand but by the means of your arm; and, besides, it would appear as if it were lame; again, were your thumb not to be upon the flat of the reins, they would continually slip through the hand, and by being lengthened, would spoil the appui; and, in order to recover them, you would be obliged every moment

to raise your hand and arm, which would throw you into disorder, and make you lose that justness and order without which no horse will be obedient, and work with readiness and pleasure.

Those motions, which are called descents of the hand, are made three different ways, either by dropping the knuckles directly, and at once, upon the horse's neck, or by taking the reins in the right hand, about four fingers' breadth above the left, and letting them slide through the left, dropping your right hand at the same time upon the horse's neck, or else by putting the horse under the button, as it is called; that is, by taking the end of the reins in your right hand, quitting them entirely with your left hand, and letting the end of them fall upon your horse's neck. These motions, however, which give a prodigious grace to the horseman, never should be made but with great caution, and exactly at the time when the horse is quite *together*, and in the hand; and you must take care in counterbalancing, by throwing back your body, the weight of the horse upon his haunches.

The appui being always in the same degree, would heat the mouth, would dull the sense of feeling, would deaden the horse's bars, and render them insensible and callous; this shews the necessity of continually yielding and drawing back the hand, to keep the horse's mouth fresh and awake. See APPUI.

The effects produced by the several positions and motions of the hand above described, are as follow: the hand directs the reins, the reins operate upon the branches of the bit; the branches upon the mouth-piece, and the curb; the mouth-pieces operate upon the bars, and the curb upon the chin of the horse.

The right rein guides the horse to the left, the left rein to the right. Would you go to the right? you pass to the fourth position of the hand, that is, you carry and turn your nails to the right; now, in carrying thus your nails to the right, and reversing your hand in such a manner that your thumb points to the left, and your little finger being raised turns to the right; you, by this means, shorten your left rein; it is this left, therefore, that turns and guides the horse to the right. Would you go to the left? pass to the fifth position; you will carry the back of your hand to the left, so that your nails will be turned downward a little, your thumb will be to the right, the little finger to the left; this will shorten the right rein; the right rein, therefore, determines your horse to the left.

We have already said, that the effect which the mouth-piece has upon the bars, and of the curb upon the chin, depends upon the branches of the bit; when the branches rise, or are turned upwards, the mouth-piece sinks; and when the branches sink, the mouth-piece rises; so that when your horse is going straight forward, if you keep your hand low, and close to your body, the mouth-piece then presses stronger upon the bars; and the chain or curb having, in consequence, more liberty, acts less upon the beard. On the contrary, if you keep your hand high, a little forward, and consequently a little out of the line of the end of the branches, the mouth-piece then sinks, and the branches, of necessity, operate upon the curb, which presses then very strongly upon the beard. Now, in order to place, and bring in your horse's head, you must hold your hand low; and, in order to raise and lighten a horse that weighs upon the hand, and carries his head too low, you must advance your hand a little, and keep it high.

Would you have your horse go back, come to the third position? but take care to round your wrist exactly, in order to work equally with both your reins; and by this means aid your horse more effectually to go back straight and balanced

lanced between your legs, which he could never do, if one rein were to operate stronger than the other.

There are particular cases where the reins are separated, and one held in each hand; it is usual to separate them, when you trot a young horse, or when you are to work one who is disobedient and resists his rider; upon these occasions, keep both your hands upon a level, low, and near your body. To turn to the right, use your right rein; to go to the left, use your left rein; but in order to make them have their effect, move your arm gently, turning it a little from your body, keeping your hand always low, and even near your boot.

Every horseman, who would be perfect in his art, ought to know the disposition of his horse, the vices to which he is subject, the causes from which they proceed, and the proper method of restraining or amending them. Sometimes a horse will rebel, when you press him to do something of which he is ignorant; in this case he should be taught what you expect. If he knows, but cannot, through inability, perform what you require, endeavour to assist nature by the help of art; but if he knows, and is able to do what you expect, first try every method which patience and perseverance can suggest, and if you fail, compel him by force and severity. A horse may be imperfect and bad from four causes: weakness, heaviness in his make, want of courage, and sloth; and four qualities must conspire to make a good horse, *viz.* strength, activity, courage, and judgment. By a combination or mixture of these different qualities, are the various dispositions of horses produced; and the remedy ought to be adapted to the nature of the animals as well as to the disorder which the horseman proposes to rectify. A horse may be difficult to be mounted; examine the source of this vice. It may be owing either to the ignorance, or the brutality, of those who have first had to do with him, or perhaps that the saddle may have hurt him, or else to a temper naturally bad. To whatever cause it may be owing, remember never to beat him; for instead of curing him, you would certainly confirm him in his vice; clap him gently when you approach him, stroke his head and mane, talk to him, and as you talk, clap the seat of the saddle; keep yourself still all the while, put your foot only in the stirrup to encourage your horse, without doing any more, in order to make him familiar, and to lose all apprehension and fear when he is going to be mounted; by little, and by degrees, at last, he will let you mount him; you will immediately get down, and remount, and so successively for several times together, without attempting to do any thing else; but send him back to the stable. If it happens that when you are upon him, he runs from the place where you got upon him, bring him to it immediately, keep him there some time, coax him, and send him away. The first lessons ought to be well weighed, when you undertake to bring a young horse to obedience, and to reclaim him from liberty to the subjection of the bridle, saddle, and the weight of his rider; so restrained, it is not surprising if he should employ all his strength against you in his own defence.

The generality of colts are difficult to be turned and guided as you would have them go; we ought not, however, to be surpris'd at this their first disobedience. It must be imputed to the habit they acquire from their birth, of constantly following their dams; indulg'd in this liberty, and subjected all at once by the bit, it is but natural they should rebel. There is no way of eradicating these first impressions, but by gentleness and patience. A horseman who should make use of force and correction, and employ it all at once upon a young horse, would discourage and make

him be vicious ever after. If, therefore, your horse refuses to go forward, you must lead another horse before him; the person who rides the colt will try from time to time, and, insensibly, to make the colt go abreast with him, and afterwards get before him. If, being surpris'd at seeing the horse no longer, he stops, or runs back, the rider must endeavour to drive him forward either by his voice, or some kind of slight instrument, or he that rides the other horse may give him a stroke with the chambriere, in order to make him go forward; if these methods should not succeed, he will go before him again with the other horse; by degrees (for one lesson will not be sufficient) the colt will grow accustomed to it, and, at last, will go on of himself.

Most horses who start have some defect in their sight, which makes them fear to approach the object. The horseman, upon these occasions, instead of having recourse to punishment, which often serves only to alarm the horse, and extinguish his courage and vigour, should first endeavour to lead him gently towards the object that terrifies him, either by encouraging him with his voice, or by closing his legs upon him, to make him go up to the object that terrifies him. If he will not go towards it, you may give him the spurs, but with discretion; and by coaxing and caresses, push him towards it insensibly. Severe correction will never cure him of this fearful temper, which is a fault inherent in his nature; nor of any imperfection in his sight, which is a disorder belonging to him; but the habit of view and smell-ing may, in time, remedy the defects of nature.

If, notwithstanding, you perceive that sloth and malice are added to these faults, you must use, as you find it necessary, both mildness and severe correction; and you will bestow them in proportion to the effect they produce. For the rest, be careful never to surprize and alarm a young horse which is shy, and apt to start; never terrify him with what he most fears; never beat him in order to make him come up to an object of which he is afraid; accustom him by degrees to it, and have patience; the fear of punishment does oftentimes more harm, and is more dreaded by him, than the very object which first alarmed him.

There are some horses who are struck with such terror at the sight of a stone, or wooden-bridge, at the sound and echo of the hollow part of it, that they will fling themselves headlong into the water, without the rider's being able to restrain him. They are to be cured of this apprehension, by covering the pavement of their stall with wooden planks, between two and three feet high. The horse standing constantly upon them, his feet will make the same noise as they do when he goes over a bridge; and he will, of course, grow familiar to the sound, and lose all apprehension of it.

To accustom them likewise to the noise of the water running under the bridge, lead him to a mill, fix two pillars directly over-against the wheels, and tie your horse constantly for two hours together, several times in the day. Having done this, bring him back to the bridge, and let an old horse, that is not afraid, go before him upon the bridge, by degrees you will find him go over a bridge as readily and quietly as if he had never had the least apprehension.

For horses that are addicted to lie down in the water, you must provide yourself with two little leaden balls, and tie them to a piece of packthread, and, in the moment that he is lying down, you must drop these into his ears; and if he rises instantly, or forbears to lie down, draw them back; but this method is not less sure than that of breaking a flask filled with water upon his head, and letting the water run into his ears.

Fire, smoke, the smell of gunpowder, the noise of guns, or other arms, naturally surprize and frighten a horse.

There

There are few that will come near fire, or pass by it, without difficulty. There are many occasions, however, in which it is necessary; it is therefore proper to accustom your horse to it. In the first place, begin with your horse by letting him see it, and for that purpose tie him between two pillars, and hold before him, at about thirty paces distant, a burning whip of straw; this should be continued for some days together, repeating it several times each day. Let the person who holds the brand advance towards the horse step by step; and let him take care to advance, or stop, often, as he perceives the horse is moved, or less frightened, who, in a short time, will be emboldened, and no longer afraid of the fire. After this, get upon him, carry him slowly, and as it were insensibly, towards the brand, the person who holds it taking care not to stir; if your horse comes up to it without being frightened, let the man on foot walk on, and let the horse follow the fire. Would you bring your horse to go across a fire, lay upon the ground some straw about half burnt out, and he will pass over it.

With respect to the noise of arms and drums, let your horse hear them before you give him his oats; do this regularly every day, for some time, and he will be so used to them as not to mind them.

A horse is said to be *entier*, in its natural sense whole, entire; and, in the figurative meaning, obdurate, stubborn, opinionated, to that hand to which he refuses to turn. A hurt in his foot, leg, or shoulder, may often be the cause of his refusing to turn to that side where he feels any pain. A hurt in his reins, or haunches, a curb or spaving, which, by hindering him to bend, and rest upon his hocks, may make him guilty of this disobedience. Art can do little towards curing these evils; consequently, a horse so affected will never dress well, because he never can be made supple and ready; besides, every horse is naturally inclined to go to one hand more than the other, and then he will go to that hand on which he finds himself the weakest, because with the strongest he can turn more easily.

It is a known fact that horses are naturally inclined to go better to one hand than to the other. The halter, the bridle, the saddle, and the girths, are all put on, and tied on the left side; when they are rubbed or curried, the man stands on their left side; the same when they are fed; and when they are led out, the man holds them in his right hand, consequently their head is pulled to the left; here is a chain of reasons sufficient to induce us to believe, that if they are readier to turn to one hand than the other, it is owing to a habit and custom which we ourselves have given them.

We seldom meet with horses that are readier to turn to the right hand than the left; and when it so happens, it oftentimes denotes an ill temper; it demands much time and pains to cure them of this fault.

Note.—It is not proper to use severe correction to make a horse obey who refuses to turn to one hand; if he is cold and dull, he will lose all his vigour and courage; if he is of an angry temper, hot, and brisk, you would make him desperate and mad; work him then upon the principles of art, and pursue the method you think most likely to reform his ill habits, and reduce him to obedience. If he obstinately refuses to turn to one hand, begin the next lesson by letting him go to his favourite hand a turn or two; finish him on the same hand, and by degrees you will gain him; whereas, were you to do otherwise, you might make him be ever after rebellious. A horse that strenuously resists his rider, if he has vigour and courage after he is reduced and conquered, will, nevertheless, succeed in what you want of him, provided he is under the direction of an able and knowing person, who understands the aids of the hands

and legs, and their mutual harmony and correspondence. Such a horse is even preferable to one who never rebels, because, in this last, nature may be deficient, if we may be allowed the expression, with respect to his want of strength and resolution.

In order to teach your horse to turn to both hands, you must separate your reins, as we have already mentioned; do not confine him too much, support him moderately, so that you may easily draw his head to one side or the other, as you would have him go, and to give him the greater liberty to turn.

If he refuses to obey, examine him; if he is by nature impatient, hot, and vicious, by no means beat him, provided he will go forward; because being held in hand, and kept back a little, is punishment enough; if he stops, and tries to resist, by running back, drive him forward with the chambriere.

The resistance of a horse whose mouth is faulty, discovers itself more in going forward than backward, and in forcing the hand. A horse of this sort ought never to be beat, he ought to be kept back, as we have just now said; you must endeavour to give him a good and just appui, and put him upon his haunches, in order to cure him of the trick of leaning upon his bit, and forcing the hand. If your horse is heavy, never press or put him together, till you have lightened his fore-part, and put him upon his haunches, for fear of throwing him so much upon his shoulders, that it may be very difficult afterwards to raise him. Take particular care to lighten every horse that is heavy before, and has malice in his temper at the same time; for if you were to press him, he would resist you through vice; in which case, by his want of strength on one hand, and being heavy and unwieldy on the other, you would be exposed to evident danger.

A restive horse is one that refuses to go forward, who standing still in the same place, defends himself and resists his rider in several different manners; it is much to be feared that one should lose all temper with such a horse, since it requires a great deal of patience to cure so capital a fault, and which, perhaps, by habit and time, is so rooted in him as to be almost natural to him. Treat a horse of this sort, who has been too much constrained and tyrannized over, with the same lenity that you would shew to a young colt. The spurs are as improper to be used to one as the other; make use of your switch, in order to drive him forward, as you will alarm him less, for the spurs surprize a horse, abate his courage, and are more likely to make him restive, than oblige him to go forward, if he refuses to do so.

There is likewise another method to punish a restive horse, it is to make him go backward the moment he begins to resist; these corrections often succeed; but the general rule is to push and carry your horse forward, whenever he refuses to advance, and continues in the same place, and defends himself either by turning or flinging his croupe on one side or the other; and, for this purpose, nothing is so efficacious as to push him forward vigorously.

The most dangerous of all defences a horse can make, is to rise directly upon his hinder legs, and stand almost quite straight, because he runs a risk of falling backward, and in that case the rider would be in danger of his life. People have endeavoured to correct this vice by a method of punishment, which might prove dangerous unless given in time, and with the greatest exactness.

Whenever the horse rises straight up, throw your body forward, and give him all the bridle; the weight of your body upon his fore-parts will oblige him to come down; in the minute that his fore-feet are coming to the ground, give

give him both the spurs firm, and as quick as you can. These aids and corrections, however, must be given with the greatest caution and exactness; for were you to give him the spurs when he is in the air, he would fall over, whereas if you watch the time so as not to spur him but when he is coming down, and his fore-feet near the ground, it is then impossible he should fall backward, for then his balance is destroyed, and he is upon all his legs again, and cannot rise without first touching the ground, and taking his spring from thence; if, therefore, you give him the spurs before he is in a situation to rise again, you will punish him, and drive him forward at the same time.

This defence is still more dangerous in horses who are of a fiery temper, and weak in their haunches at the same time. These are continually apt to rise; and whatever precautions the rider may take, he is in continual danger of their coming over; the way to correct them is this; tie your horse between the pillars very short, put on a good cavesson of cord, and do not suffer him to be mounted. Prick him upon the buttock with a spur, or sharp piece of iron, in order to make him strike out behind; encourage him when he kicks, and continue to make him kick, encouraging him from time to time, when he obeys; do this for a quarter of an hour every day. When you perceive that he begins to kick the moment after you so prick him, without waiting till he feels it, get upon him, hold your reins long, prick him, and let a man stand by and prick him at the same time; encourage him when he kicks, and continue to prick him, to make him do it, till he will kick readily only at the offer you make of pricking him; he ought to be brought to this point in five or six days. After this, take him out of the pillars, mount him, and trot him in the longe, and make him kick by pricking him behind; after that, let him walk two or three steps, then make him kick again, and so work him by degrees. Put him to the gallop, and if he offers to rise, prick him behind, and make him kick; nothing excels this method, to break a horse of this terrible and dangerous vice.

Those horses who are subject to kick, either when they go forward, or stand still, must be kept much together, or held in closely, to make them go backward, and you will cure them of this vice.

He who would succeed in correcting the vices of horses should never depart from this maxim; always to observe a just medium between too indulgent lenity and extreme severity; work your horse according to his strength and capacity; give your lessons in proportion to his memory; and dispense your punishments and rewards suitably to his courage and disposition. See Berenger's *Hill, and Art of Horsemanship*, vol. ii. ch. 1, 2, 3. See also AID, AIRS, APPUI, BALLOTADES, CAPRIOLES, CORRECTIONS, CROUPEDES, CURVETS, ENTIER, EPALLE *en Dedans*, GALLOP, HAND, MEZAIR, PASSADE, PASSAGE, PESADE, PILLARS, PIROUETTE, RAMINGUE, RESTIVE, STEP and LEAP, STOP, TERRE-A-TERRE, TROT, UNION, VOLTE.

RIDE, among sheep farmers, a term applied to rams, which, when they are put to the ewes, are said to be at ride. See RAM.

RIDE, in the *Sea Language*, a term variously applied. Thus, a ship is said to ride, when her anchors hold her fast, so that she drives not away by the force of the wind or tide.

A ship is said to *ride well* or *easy*, when she does not labour heavily, or feel a great strain, when anchored in an open road or bay. On the contrary, when she pitches violently into the sea, so as to strain her cables, masts, or hull,

she is said to *ride hard*, and the vessel is termed a bad roader.

A ship *rides across*, when she rides with her main-yards and fore-yards hoisted up to the hounds, and both yards and arms topped alike.

She is said to *ride a-peek*, when one end of the yard is peeked up, and the other hangs down: this is also said of a ship, when, in weighing, she is brought directly over her anchor.

She is said to *ride athwart*, when her position lies across the direction of the wind and tide, when the former is so strong as to prevent her from falling into the current of the latter: and to *ride betwixt wind and tide*, when the wind hath equal force over her one way, and the tide another, so that she is in a manner balanced between them, and rides without the least strain on her cables. If the wind have more power over her than the tide, she is said to *ride wind-rod*.

She is said to *ride hazardous*, when, in stress of weather, she falls so deep, that the water runs in at her hauses.

She is said to *ride portoise*, when her yards are struck down upon the deck, or when they are down a-port-laft.

To RIDE land-locked, at sea. See LAND-locked.

To RIDE by the Stoppers. See STOPPERS.

RIDEAU, in *Fortification*, a small elevation of earth, extending itself lengthways on a plain; serving to cover a camp, or give an advantage to a post.

The word, in its original French, signifies a *curtain* or *cover*, formed from the Latin *ridellum*. Borel derives it from *ridere*.

A rideau is also convenient for those who would besiege a place at a near distance, and to secure the workmen in their approaches to the foot of a fortress.

RIDEAU is sometimes also used for a trench, the earth of which is thrown up on its side, to serve as a parapet for covering the men.

RIDEAU, in *Geography*, a river in the eastern district of Canada, which runs into the Utwas, or Ottawa. N. lat. 45° 15'. W. long. 76°.

RIDER, a town of Arabia, in the province of Hadramaut.

RIDER, in *Artillery Carriages*, a piece of wood, somewhat higher than it is broad, and of a length equal to that of the body of the axle-tree, upon which the slide-pieces rest in a four-wheel carriage: such as the ammunition-waggon, block-carriage, and sling-waggon.

RIDER is also used for after-clauses, added to bills, whilst they are depending in parliament.

RIDER-Roll. See ROLL.

RIDERS, *Out*. See OUT-Riders.

RIDERS, in *Ship Building*, interior ribs, to strengthen and bind the parts of a ship together, being fayed upon the inside stuff, and bolted through all. They are mostly used in ships of war, and are variously situated, as the *floor-riders*, which are fayed athwart the keelson, and should be placed over the first futtocks. The next are the *first futtock-riders*, which lay alongside the floor-riders, and give scarp above them: these are connected by cross-chocks athwart their heels, that scarp to each side with hook and butt. The next are *second futtock-riders*, which lay alongside of the first futtock-riders, down to the floor-riders, and run up under the orlop beams. The *third futtock-riders* lay alongside the second futtock-riders, scarp or meet the heads of the first futtock-riders, and run up to the gun-deck beams. The whole are bolted together fore and aft. Breadth and top-riders, which were above the former, seem now to be discontinued.

tinued in the navy, as they could only be useful in wake of the main and fore-chains, as the midships is much better strengthened now by uniting the fides and *skid-beams* together by the knees.

These riders stood diagonally, so as to fasten through two or more timbers, the strength depending much thereon. The top-riders came up to the top of the side, and the breadth-riders between them and the third futtock-riders, or on the broadest part of the ship, and hence their name. Riders are not so much required in merchant-ships as in ships of war, excepting floor and lower riders in large ships (which are generally of iron, so as not to interrupt the stowage), because the cargo being stowed low down, and the rigging lighter, the upper works are not so liable to strain and labour, like those ships of war having their heavy ordnance above the line of floatation.

RIDGE, in *Buildings*, the highest part of the roof or covering of a house.

Ridge is particularly used for a piece of wood, in which the rafters meet.

RIDGE-Tyle. See **TYLE**.

RIDGE, in *Sea Language*, is a long assemblage of rocks, lying near the surface of the sea, so as to intercept the passage of a ship under sail.

RIDGE-Tackle. See **TACKLE**.

RIDGE-Ropes. See **ROPES**.

RIDGEFIELD, in *Geography*, a post-town of America, in Fairfield county, Connecticut; 10 miles S.W. of Danbury. This township was called by the Indians "Caudotowa," or high land. It was settled in 1709, and contains 2103 inhabitants.

RIDGES, in *Agriculture*, are pieces of ground laid up between two furrows, having always considerable length, but different small breadths, according to circumstances.

It is stated by the author of the Present State of Agriculture in Great Britain, that in many of the more fertile and populous districts, the ridges are found remarkably crooked, unequal in breadth, and made to rise towards the middle, or crown, to the height of several feet above the furrows, on either side. And he supposes that these are formed in the worst manner, to answer the purposes which are now intended by dividing a field into ridges. But this, he thinks, could not have escaped the notice of all the farmers of former periods; but that, on the contrary, from the practice being so general, it is more than probable that such form, though now considered absurd, was formerly supposed an improvement, as in the case of many other practices of antiquity; as in many of the hilly situations in Scotland, where the soils are dry, and in a tolerably level state, and where cultivation had without doubt taken place at a very early period, although at present abandoned to the growth of heath, the ridges are found as straight as those in the best cultivated districts in the kingdom. The reason which induced the cultivators of these times to construct the ridges in such forms, may, he thinks, be explained in this way; that as the lands were mostly cultivated in the open field, or run-ridge state, the furrows of the ridges were, for the most part, the mark or boundary between one farmer and another. The portion of land belonging to a tenant in any one place being on this account so small, as to prevent him from employing any other mode of drainage, than that of raising the ridge to such a height, as to permit the water to discharge itself by the furrows, without injuring the crop. It is stated, that all the ridges that are broader at one end than the other, will generally be discovered to be the narrowest at that end which is still the most wet and spouty. It is of

course conceived, that this form was purposely given them, as the only means by which lands in such a state could be drained. And that, as the most crooked ridges are found on the steep and sloping grounds, it may be supposed that that form and position were adopted by the first cultivators, as the best for preventing the soil from being washed away by sudden falls of rain, which must no doubt have been the case to a greater extent, had the ridges been straight. Each furrow, by becoming a sort of small rivulet, without any thing to impede its course, must have done more mischief to the soil than if it had been gradually taken off the circuitous course of the crooked ridges.

But from the change in the nature of possessing lands, proprietors and tenants having now, except in a few open field districts, the means of draining and forming the ridges in the most effectual manner, these old forms of ridges, which can only be useful in such cases as the above, are not only rendered useless, but operate strongly against the full improvement of the soil. But notwithstanding this, there is, it is conceived, no sort of business in which the farmer can be engaged, that demands more judgment and caution than that of levelling and altering the direction of such sorts of ridges. However, before the mode of managing this in the cheapest and most effectual manner is explained, it may be proper to shew the most suitable forms and directions in different sorts of soil, and under different circumstances of the grounds.

In forming ridges, great attention is necessary to the nature and quality of the soil, and the particular situation of it, as the size, height, and direction must, in a great measure, be governed by them. It has been observed by a late practical writer, that where the land is of such a nature as to be highly retentive of moisture, or, from the peculiarity of its position, liable to become too wet for the growth of useful crops, the ridges should in general be made narrower, and have a more rounded or convex form, than in the contrary case, or where it is exposed to injury from becoming too dry. But, in the first case, they ought not, however, to be raised so very high as is sometimes the practice, as by such means much inconvenience is often sustained from the crowns becoming too dry, and the grain ripening in a slow and partial manner. Besides, narrow ridges, with but a little elevation, are, in general, much more effectual in taking away the water that may be injurious.

It has been remarked by the writer of the Perthshire Agricultural Report, in respect to the height of ridges in lands of more dry description, that as the furrows, in general, produce less crop than any other part of the ground, the fewer furrows the better, provided the land can bear it. If the field be dry, there is not only more produce by fewer furrows, but the ridges are cloven by every ploughing (a thing that cannot be done in raised ridges with deep furrows), which keeps them in an uniform level surface, and greatly facilitates the labour of spring and harvest. Persons who are not accustomed to investigate the cause of what they daily see, are deterred from making their ridges nearly flat by the waters that stagnate, in the strips of grass and sprits that lie between the ridges, which they have raised greatly in the middle: never considering that they are working against nature, because the more the ridges are rounded the deeper are the furrows, till they become like ditches, and the more readily do clods fall down, so that they are with their own hands producing the very evil which they wish to prevent. Whereas, were the strips of flags and other trumpery torn up, were the furrows less deep, and kept

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kept perfectly clean and open, to allow a free passage to the water, the whole would flow to the open drain at the extremity of the field; and the higher the furrows are, in respect to this drain, their relative height would make the water flow the faster. Care should always be taken that the clods that fall back into the furrows, and dam the water in such land, should be removed with the spade. The slovenliness of men in this particular circumstance, more frequently produces the stagnation complained of, and all its baneful consequences, than either ridges moderately raised, or any other cause. This he considers as perfectly satisfactory, in respect to laying out such lands into ridges in the first instance. But that, in cases in which neither the circumstances of the soil, nor the nature of its situation, require that the ridges should be formed in a particular manner, or of any certain breadth, that of making them about eighteen feet may be the most suitable, as they are found to answer well in the way of keeping the ground properly dry, and of the most convenient dimensions for turning the teams at the ends in ploughing. And that besides, the feed, where this method is pursued, can easily be sown by one cart up and another down; an operation which, in other circumstances, would be attended with considerably more labour. That, in the covering of the seed by means of harrowing, the work is also accomplished with more facility and dispatch, as by employing double implements of this kind, one turn may wholly finish the business. And that in the reaping, too, they have advantages, in allowing the number of reapers that are necessary to work with convenience, and without being in the way of each other. This, though a great advantage in some cases, is of less consequence since the mowing of grain is become more general.

But it is stated, that wet, clayey, or any stiff and tenacious loamy soils, where the under stratum is clay, should be ploughed as much as possible into ridges of much less size, in order that they may be kept in a state of dryness, suitable to the growth of the crops that are to be put upon them. Three or four feet, according to the degree of tenacity and wetness, may, in such sorts of land, be fully sufficient. And it is added, that in the counties of Essex and Hertford, on this sort of wet soils, three feet are found to answer the purpose in a very effectual manner. And that it has been observed in the Middlesex Agricultural Report, on the authority of much experience, that their superiority over ridges of greater breadths, for taking the water off without washing the land, is incontrovertible. That, in short, as there is much variation in lands of these kinds, the width and flatness of the ridges should be increased as they recede from the nature of clay or clayey loam, and approach that of sand, in order that a larger proportion of moisture may be preserved: while, on the contrary, as they are becoming more of a clayey quality, they ought to be narrower, and to have a more high and rounded form, that the discharge of injurious moisture may be more expeditious. In loamy soils they should be either broad and flat, or narrow and round, in some measure, according to the degree in which they approach the sandy or clayey soils. And that, in very wet clayey soils, where they rest upon a subsoil of some porous kind, great advantage in the way of drainage may often be obtained, by sinking the furrows so deep, as to reach it. But some persons, on these sorts of clayey soils, suppose the best breadth to be ten or twelve feet, as where they are narrower there is much disadvantage, though they keep the land drier. Also, in lands of the marshy or fenny kinds, as mostly approaching in some degree to the nature of these, the ridges should be made narrow, and rather round in their forms.

But that as the principal defect of lands of the sandy kind is that of parting with their moisture too readily, and of course becoming quickly in a state of too much dryness for the purpose of healthy vegetation, it is the most advisable to plough them into very broad ridges, or even in some cases quite flat, without the least degree of furrow being made; as, in this way, the moisture may be more effectually retained in such soils, to the great advantage of the crops which are grown upon them. But in the constructing of ridges on such soils as are of the boggy or mossy kinds, some attention is necessary in respect to their depth, and the proportion of wetness that may be present; as where they are thin, and have but little injurious moisture, they may be more broad and flat than where they are deep of moss, and more retentive of moisture: six or seven yards may, in general, be the best. It is observed, that even in the deeper sorts, long experience has shewn that, in the first instance, it is improper to make them too high or too narrow; as, in the former case, they throw the water off from their sides, without admitting it to penetrate their substance, the top of course gets too dry; while, in the latter, there is a loss of surface, from too many division furrows. The breadths already mentioned are found to be the best; and when the improvement is completed, the ridges appear like segments of wide circles, with a clean well-defined division furrow between each of them. The moisture is thus caused slowly to filtrate through the moss, rendered friable by lime, until it reaches the division furrows. It is generally necessary to clean these out before winter, and at the time the crop is sown, until the moss acquires solidity. This has been fully shewn in a paper, in the second volume of Communications to the Board of Agriculture. See the work.

And it has been remarked, that ridges in these soils are generally formed by the spade, the workmen beginning nearly in the middle of the part which is to form the ridge, only leaving the space of about eighteen or twenty inches, upon which the materials raised from the trenches on each side are deposited, so as to constitute the crown; and in this way, digging up and turning over narrow spits on each side, the workman proceeds till he comes to the division furrows, which are cut out and laid on the sides: in which way, the ridge, when completed, appearing as if done by the plough. And in the deeper mossy soils, especially of the more spongy kind, it is probable the breadth of the ridges may be increased with advantage, after they have collapsed and become sufficiently firm; as, by such means, they will be more suitable for being laid down to grass or sward, for the purpose of pastorage.

Further, in what respects the general disposition of ridges, where there is not a necessity of giving them any particular direction, either for the purpose of drainage, or other circumstances, they should be formed as much as possible in the direction of north and south; as, by that means, much advantage may be gained in the crops attaining maturity, and in becoming dry, from their having the more full influence of the sun and wind. And it has been remarked by Mr. Marshall, in his *Midland Economy*, that the shocks, after grain has been reaped, should be set in the same direction, and not have an east and west position; as, in this case, the sheaves on the north side are many days later in being in a proper condition for being conveyed to the stack, than those on the south. From further experience, he is also convinced of the bad effects of ridges having an east and west direction; it having been found that corn, on the south sides of such as were not by any means high, shot into ear, and changed and ripened a week at least earlier than that on the north; and that at the time of reaping, the wheat on

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the south sides was, in some patches, too ripe; while that on the north sides was, in many parts, absolutely in a green state.

But where the ridges are to be constructed in such lands as are hilly in their situation, or have much declivity, it is necessary that they be neither made too steep, nor have too much of a horizontal direction given them; being drawn in such a manner, as that they may have that sort of easy sloping direction, by which the water may be taken off in a gradual easy manner; as, in this way, there will not only be great advantage in the saving of labour in ploughing, nearly one-third less power in the team being sufficient; but the injury and inconvenience of heavy rains washing down the soil and manure will in a great measure be obviated. It has been stated by the author of the Gentleman Farmer, that in a hanging field, that had been carefully dressed with lime and dung for turnips, and in which the turnips were fairly above the ground, a heavy summer shower swept down the crop, together with the lime, dung, and a portion of the loose soil, leaving the land naked and exposed. Therefore, in the forming ridges in lands that have such situations, it has been well observed by the author of the Agricultural Report of Perthshire, that when the fields hang so much as to be accounted steep, the ridges ought neither to be drawn parallel to the bottom of them, nor at right angles, straight up and down; either of which would be inconvenient in the ploughing, and injurious to the soil; but they ought to be drawn diagonally. The great point is to understand in what direction this diagonal slope of the ridges ought to run. In this respect the tenants of Ballygowan, in this district, are perfectly correct; and it is his wish that their example were followed by all farmers, whose land has a great declivity, of which there is a considerable proportion, not only in that, but in all hilly countries whatever. The form and direction of the ridges are, he thinks, contrived with such judgment, that the furrow (or, as Lord Kames with more accuracy calls it, the furrow-slice) falls easily away from the mould-board, as well in ascending as in descending the field, which is the principal secret. There can be no more than two diagonal lines in any four-sided figure, which is generally the form of inclosures; and if you bring a sensible ploughman to each of the angles below, desiring him to look towards each of the opposite angles above, he will at once tell you which of these diagonal directions is easiest for himself and his horses, and will accordingly fix on that line by which the furrow, in ascending, will fall most readily into its place, having his right hand and the mould-board of his plough with a side-aspect to the bottom of the field. But, with the view of rendering this more obvious, suppose the field to have a steep descent and a southern aspect, the ridges are drawn from south-west to north-east; which is the case in the instance alluded to. Suppose, again, the field to have a northern aspect, the ridges are drawn in the same direction, but with this difference in ploughing, that you ascend south-west in the last case, whereas you descend south-west in the first. If the field fronts the east, you ascend north-west; or invariably four points forward from the slope of the field, in going up the hill. Besides the vast saving in respect to the power or strength of the team in this way, and that of the soil being less liable to be carried away by rains, by the running of the water in the furrows; where the ridges are made parallel to the bottom of the field, all the dexterity of a man and force of cattle that could be applied would be insufficient to turn every second furrow up against the hill.

It is remarked, that the expedient universally employed, according to the old system, in ploughing fields of this

kind, was either to plough with a double mould-board, or, if the mould-board were single, to plough only one furrow in going twice the length of the ridge; but most frequently the last. Both are, he thinks, bad husbandry. In the former method, you lose none of your time, indeed; but one half of your labour is lost by the latter. His principal objection, he is of opinion, holds equally against both. All the soil is, year after year, rolling downward; and in process of time, the upper part of the field will be peeled to the bone, and quite bare of soil, while a great bank is accumulating at the bottom, like a dunghill, composed of the richest land in the field; and withal, the furrows are laid so completely on their backs, that little benefit is derived from the manure, excepting it be laid on the surface the first year.

The same writer further states, that where a hill is to be dressed, in order to be laid down to grass, it ought to receive the latter furrow by going round in a spiral line, without ever turning the plough, beginning at the base, and ending at the top. This requires less labour, and is more beautiful. In preparing the ground for this last furrow, it may be ploughed diagonally, to keep the soil from tumbling down hill, as has been mentioned above, in respect to declivities: for this purpose, the surface of the hill may be divided into three or more sections. And it is remarked by a late practical writer, in addition, that, in this way, no more strength of team is required in ploughing such elevations than in that of ploughing on a level; while, where the soil is of the gravelly or sandy kind, the great inconvenience of the moisture going off too quickly is guarded against, by its being detained in the furrows. And the spiral furrow is, according to the first writer, the nearest method of finishing off a lawn, even of flat land, near a gentleman's house; as it brings the whole surface to an uniform appearance, and pleases the eye more than having the lawn striped with furrows.

In regard to such lands as are level, or have but little inequality of surface, the best general practice, it is observed by the author of a late work, is to form the ridges as straight and as regular in respect to breadth as possible; as, by having them crooked, and of irregular breadths, the water is not only liable to stagnate and injure the soil, but the friction in ploughing is greatly increased, and the furrow-slice is not so well laid over, being more disposed to fall back. And, besides, many unnecessary turnings are requisite, on account of the inequalities of breadth, by which much time is lost, as well as much trouble given to the ploughman in managing the plough while at work.

In some of the less improved counties in the northern parts of the kingdom, as Lancashire, and those adjoining it, the ridges on the old lands are often narrow, crooked, and very ill laid out, being for the most part too much rounded in the middle parts, and in the form of butts, which are the states in which they are at the present time, few or no attempts having been made to alter them in any way. However, from the nature and depths of the soils, it would not appear that there would be any danger or difficulty in doing it; though this may be the case in some other situations, where it ought to be attempted with proper caution. In some parts of the above district, as that of the field, the term *farrowing* or *furrowing* is often made use of, instead of that of ridge.

Method of Levelling and Straightening old Ridges.—In such kind of land as has been long in a cultivated state, high, crooked, and irregular ridges are frequently met with, that often become necessary to be altered, so as to be rendered more straight and level. This, though apparently simple,

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is a matter of more difficulty and trouble, and which demands more knowledge and care in its execution, than is commonly supposed by persons unacquainted with the business. Various obstacles have been thrown in the way of this sort of improvement by farmers in different districts. By some the expence is considered as very great, while others oppose it on the ground of the injury done to the land for some years afterwards. And according to the Agricultural Report of the county of Perth in Scotland, the objection made by some farmers in the Carse of Gowrie is this: in the action of levelling ridges, that have been, time immemorial, raised high in the crown, much soil is brought up, which for ages had neither seen the sun nor smelled the air. This, like most other soils, which has been so long and so deep buried, is very unproductive at first, and blasts all their expectations. It is perfectly consonant to the process of nature, the writer supposes, that this should, in some measure, happen; and, as far as it has any weight, is an argument not only against levelling, but against straightening the ridges of such land. But was not, he asks, every particle of that soil, which is so much reprobated, on the surface of the ground before the ridges were so raised by the hand of man? Was not this very soil, at that time, as good as any soil in the field? Nay, was it not much more fertile before it was buried in the middle of the ridge, than the *new* soil, which the ploughman was digging up year after year, out of the sterile furrow, to assist in gradually raising his ridge higher? Every man must answer in the affirmative. If you therefore bring back your land nearly to the level in which the hand of nature left it, you will find the very soil, which had been fertilized by the deciduous parts of plants, from the creation, until it came into cultivation; the soil which Providence intended for the production of grain for the use of man, this soil has not surely lost its fertility, although that fertility has lain long dormant by its being covered up in the bowels of the earth, and removed from the benign influence of heaven. The fertility of a soil cannot be exhausted by any other means, but by over-cropping. It may be suspended, as in this instance, but not annihilated. Restore the soil to its native place, and to that influence of which it was deprived, and it will soon become equally productive as at first. It is not pretended that its fertility will be exerted all at once. Clay is a stubborn soil: it is neither so easily stimulated by manure, nor by the benignity of the atmosphere, as other soil. It requires time and labour and expence to set it in motion; but when moved it retains its powers longer and makes very ample returns. And in addition to these observations, vast benefits must in many cases result from bringing ill-formed ridges into a proper situation for the advantageous culture of crops upon them.

With regard to the time or season for the execution of this sort of work, it has been remarked that the most suitable period for accomplishing it where the plough is employed, is when the land is undergoing a course of repeated ploughings, as in the case of a fallow; as under such circumstances the more elevated parts of the field may be ploughed over as often, and in such directions, as is most suitable for bringing them into a level state. Where the ridges are not raised to any very considerable height in their middles, but badly formed in other respects, they may sometimes be readily brought into proper order by being split, or cloven down occasionally; a mode which is performed by beginning at the furrows and terminating at the crown or middle of the ridge, so that the former furrows become the crowns, and the new furrows are made in the middle of the old ridges, which being filled by a furrow from each side, has the tendency of soon bringing them into a more equal

and level form. But that in cases where the soil is of the light, gravelly, or open and mellow kind, the plough may be conveniently employed in levelling the ridges, without producing any injury of consequence to the crops that may afterwards be put upon the land. It is proper, however, even in lands of these kinds, to use such caution in performing the operation, in order to avoid the injury that might be caused by too large a proportion of the under soil being brought to the surface in different parts of the ground, and in that way rendering it less productive in crops than it was before.

It has been contended, however, by Dr. Anderson, in the first volume of his Essays, that where this sort of work is done by such implements as are contrived for expeditiously bringing high ridges to this situation, as ploughs, harrows, drags, &c. the farmer of necessity buries all the good mould that was on the top of the ridges in the old furrows: by which he greatly impoverishes one part of his field, while he too much enriches another; inasmuch that it is a matter of great difficulty, for many years thereafter, to get the field brought to an equal degree of fertility in different places: which makes it impossible for him to get an equal crop over the whole of his field by any management whatever: and he has the mortification frequently, by this means, to see the one half of his crop rotted by an over-luxuriance, while other parts of it are weak and sickly, or one part ripe or ready for reaping, while the other is not properly filled; so that it were, on many occasions, better for him to have his whole field reduced at once to the same degree of poorness as the poorest of it, than have it in this state. An almost impracticable degree of attention, in spreading the manures, may indeed in some measure, he thinks, get the better of this disease: but it is so difficult to perform this properly, that he has frequently seen fields that had been thus levelled, in which, after thirty years of continued culture and dressings, the marks of the old ridges could be distinctly traced when the corn was growing, although the surface was so level that no traces of them could be perceived when the corn was off the ground. But this, he remarks, is a degree of perfection in levelling that cannot be usually attained by following this mode of practice, and therefore it is but seldom seen; for all that can be expected to be done by any levelling machine is to render the *surface* perfectly smooth and *even* in every part at the time that the operation is performed: but as in this case the old hollows are suddenly filled up with loose mould to a great depth, while the earth below the surface, upon the heights of the old ridges, remains firm and compact, the new-raised earth, after a short time, subsides very much, while the other parts of the field do not sink at all; so that in a short time the old furrows come to be again below the level of the other parts of the field, and the water, of course, is suffered in some degree to stagnate upon them, inasmuch that in a few years it becomes necessary once more to repeat the same levelling process, and thus renew the damage that the farmer sustains by this pernicious operation. He therefore thinks that on these accounts, if the farmer has not a long lease, it will be found, in general, to be more for his interest to leave the ridges as he found them, than to attempt to alter their direction: and if he attends with due caution to moderate the height of these old ridges he may reap very good crops, although, perhaps, at a somewhat greater expence of labour than he would have been put to upon the same field, if it had been reduced to a proper level surface, and divided into straight and parallel ridges. However, where a man is secure of possessing his ground for any considerable length of time, the advantage that he will reap from having level and well laid

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out fields are so considerable, as to be worth purchasing if it should even be at considerable expence. But the loss that is sustained at the beginning by this mechanical mode of levelling ridges, if they are of considerable height, is so very great, that it is, perhaps, doubtful if any future advantage can ever fully compensate it. On these grounds he rejects the use of machinery in these operations, and recommends the method described below as being more efficacious and successful. There have, however, of late been many valuable machines contrived for the purpose of accomplishing the work in an easy and cheap manner, and which have been found to answer in practice. An implement of this sort has been described under the head machine. See *MACHINE Land Levelling*.

But where the lands are of the clayey, loamy, or tenacious wet quality, there is much greater difficulty, as well as greater attention required, in levelling down and changing the forms of the ridges, as it frequently happens that in such soils, after the earth from the crowns has been removed in order to render them level, a coarse, unfriendly, stiff soil is brought up, as has been seen above, that requires a great length of time and much amelioration to bring into a state capable of supporting good crops of any sort of grain. In these cases and sorts of soils, in the straightening and bringing down the ridges on the coarse lands in the northern parts of the island, the author of the Perth Agricultural Report advises it as proper to begin the operation by removing the made or ameliorated soil on the crown of the ridge to one side, which may, he thinks, be done by two or three ploughings in one direction, turning the furrow always one way. This is easier than doing it with the spade. Then such a quantity of the buried soil may be cast with the spade from the crown of the ridge, as will fill up the furrows at pleasure; and, lastly, the ameliorated soil may be spread over the surface of the whole. If it is not thought enough to save the ameliorated soil on the crown of the ridge alone, first one side of the ridge may be taken, and then the same process repeated on the other; by which means almost all the wrought soil may be kept on the surface. A good summer fallow and a hearty dose of lime, and the mixture of wrought mould, will reanimate the new soil, and restore its vegetative power to its primitive state; and a very few seasons will naturalize the whole soil, while the farmer has the advantage of straight ridges, moderately raised. Some, however, think that this business may be best performed by the spade, though it is now obviously impossible in many situations from the vastly increased expence of labour. Where this mode is to be employed, it is advised by Dr. Anderson, in his *Essays on Agriculture and Rural Affairs*, to let a number of men be collected, with spades, according to the extent of work, and then set a plough to draw a furrow directly across the ridges of the whole field intended to be levelled. Divide this furrow into as many parts as labourers, allotting to each a ridge or two, more or less, according to the number and height of the ridges, and other circumstances. Let each of the labourers have orders, as soon as the plough has passed that part assigned him, to begin to dig in the bottom of the furrow that the plough has just made, about the middle of the side of the old ridge, keeping his face towards the old furrow, working backward till he comes to the middle of the old ridge, going deeper as he advances, suitable to the height he has to bring down; then let him turn towards the other furrow, and repeat the same on the other side of the ridge, so as to leave the bottom of the trench he has thus made across the ridge, entirely level, or as nearly so as possible. When he has finished that part of the furrow allotted to him, which

the plough has made in going, let him then go and finish in the same manner his own portion of the furrow which the plough makes in returning. In this manner each man performs his own task through the whole field, gradually raising the old furrows as the old heights are depressed.

And the old furrow ought to be raised to a greater height than the middle of the old ridges, so as to make allowance for the subsiding of that loose earth. And the operation is thus finished at once. He recommends the making of these temporary or cross ridges 40 or 50 yards broad at least: for although some time will be lost in turning at the ends of the broad ridges, the advantage that is reaped by having few open furrows is more than sufficient to counterbalance this loss: and in order to moderate the height that would be formed in the middle of each of these great ridges, it will always be proper to mark out the ridges, and draw the *furrow* that is to be in the middle of each, some days before you collect your labourers to level the field, to prevent any hurry or loss of labour in the future operation of levelling. The field will thus be reduced at once to a proper level, and the rich earth that formed the surface of the old ridges will still be kept on the surface of the field to be formed into new ridges. And the same writer adds, that the direction of the ridges, as noticed before, ought to be north and south, if the field will permit, by which means the east and west sides of the ridges, dividing the sun equally between them, will ripen at the same time. Also further, that when the soil is so wet as to require the raising of the ridges, they ought to be made twelve feet wide, and twenty inches high, and to be preserved always in the same form, by *casting*, that is, by ploughing two ridges together, beginning at the furrow that separates them, and ploughing round and round till the two ridges be finished. The separating furrow is indeed raised a little higher than the furrows that bound the two ridges, but at the next ploughing that inequality is corrected by reversing the operation, which is easily done.

And in regard to the expence of the different methods, the following statements are given by the same writer, which, though far below the present price of labour, may furnish the means of calculation to the improver. Supposing the price of labour in Scotland to vary in different places from sixpence to one shilling, and that the medium price be fixed at nine-pence a day; and that the hire of a plough, with four horses and two servants (for so many, in general, will be requisite to labour properly ground in the condition that this is supposed to be in), varies in like manner from three to five shillings *per* yoking, and that the medium price of this be called four shillings; in this case the comparative expence of levelling, by these two different modes, would be as follows.

Expence of Levelling by Spade.

	£	s.	d.
For wages to eleven labourers one day, at nine-pence each	0	8	3
For the hire of a plough 2½ yokings, at four shillings each	0	10	0
Total expence of one day's work	0	18	3

Expence of Levelling by Plough and Harrows.

For two yokings and a half of a plough, as before	0	10	0
For harrowing ditto, supposed at one-fourth of the ploughing	0	2	6
Total	0	12	6

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	£	s.	d.
Total for once ploughing, &c.	0	12	6
The same five times more repeated	3	2	6
Total expence of levelling by plough and harrow	3	15	0
Total expence of levelling by the spade	0	18	3
Difference	2	16	9

But another method practised by Mr. Pateron of Cattle-huntley is, according to Dr. Robertson, first to open up with the spade a trench of about ten feet broad, from end to end of the field, in the same direction that the ridges are to be made. The upper surface of the ten-feet trench is laid upon one side, to be removed afterwards. Then the under soil of this trench is levelled and dressed by the spade and wheel-barrow, or carts, if necessary, at the same time giving the land a gentle fall at both ends, to enable the water to run off in the furrows towards the main drains. When this under soil has got its proper shape, he marks off another ten-feet trench, and with the spade throws the upper soil of the second trench on the new-formed under soil of the first trench, so as to cover it completely and equally: and so on through the whole field. The upper soil of the first trench was carried round in carts, and laid on the under soil of the last trench. The appearance of the field was then regular, rising in the middle and falling at both ends. He recommends ridges eighteen feet wide. The whole expence is supposed to be 8*l.* an acre. And it is observed in the third volume of the Farmer's Magazine, that ridges in enclosed lands are capable of being straightened with profit, or at least without loss, by wearing down the high ridges by the preceding crops, so as not to leave too much to the fallow, which is by turning one field at least into turnip or fallow every year until the whole is gone over. For as the land is ploughed and barrowed over and over in all directions, until it is brought to a close fine mould, the ridges may then be laid off just as the farmer pleases, without any loss. But that in straightening without this previous operation, the loss cannot be calculated. The advantages are therefore obvious to every man.

A writer in the fifth volume of the same work also observes, that in wet clayey soils, where the operation is undoubtedly most difficult to execute, he has accomplished the business with facility in this way. On dry soils, very little judgment or skill is required to do it, with safety to the ground, and advantage to the occupier. He states, that in 1794 he fallowed and straightened a field of about thirty acres, which had been oats the preceding year. The soil was a wet clay, and the ridges were very unequal in breadth, from ten to thirty feet, intermixed with *batts* or *guffets*, which are always detrimental to such lands, as they occasion the ploughs, &c. to turn often upon the other ridges, by which means the prints or marks of the horses' feet are left unfilled up. The first operation consisted in cleaving down the ridges. The field was then ploughed across, and thoroughly harrowed: but before the broad ridges could be brought to a level, several ploughings were necessary, which were accordingly given. The season, however, was far advanced before these necessary operations could be effected; and, as lime could not at this time be applied with advantage, he was under the necessity of laying it up in heaps, in an adjacent grass field, so as it might be expeditiously laid on whenever the field was straightened. The next consideration was, to form the ridges in such a manner as to prevent water from stagnating upon the ground. With this view, he run

them partly east and west, and partly north and south, as the level would admit. When the ridges were thus formed and gathered up, the lime was applied, and a good cross-harrowing given, in order to fill up the furrows. And it being now the latter end of October, and the weather very wet, he thought it advantageous, in giving the seed furrow, to yoke the horses in line, and not a-breast, as is the usual practice. The whole field was sown on the 6th and 7th of November, and the braird appeared about the beginning of December. The weather having been wet for some days after the wheat was sown, it appeared rather thin in March, but always retained a dark green colour. It improved much during the summer months; and at harvest, turned out as good a crop as ever he saw upon such poor wet soil, the produce *per* acre being from thirty-two to thirty-four Winchester bushels of good marketable grain. Next year he ploughed the field again, and sowed one half with oats, and the other half with peas, both which were as good crops as could be expected. Perhaps it may be thought that he should have sown grass seeds among the wheat; but it is his opinion, that when ridges have been altered, a second fallowing is necessary before the field can be profitably laid down to grass. Last year he straightened a field in the above-mentioned way, which has answered his expectations to the full. It was sown with grass seeds, which at present promise well. He concludes by observing, that the advantages resulting from the practice of straightening ridges are obviously many and great. More work is performed both by plough and harrows, and to better purpose, in a given space of time: much seed too is saved; for when the ridges are at or below eighteen feet in breadth, which they ought never to exceed, two casts will suffice: whereas, in their former state, three, or even four casts, will be necessary in some parts, and in others one will be too much. Straightening ridges, and making them all of one size, also greatly furthers harvest work, as it is well known, that clearing is more expeditiously performed upon them, than upon those that are unequal with one another, or such as are broad at one end and narrow at the other. The last, though not the least advantage, which he shall notice at present, is, that wheat is not so apt to canker upon straight as upon crooked ridges. He will not now inquire how this comes to be the case; but leave it to the consideration of those who delight in abstract philosophical researches: it is sufficient for him to be assured, from experience, that it is so. The business of straightening and levelling ridges, in many situations, certainly demands much more attention than it has hitherto met with by the farmer and land proprietor.

But besides these modes of ridging, which are necessary in laying out lands for the purpose of tillage, there are others that become requisite in consequence of the growth of particular sorts of crops, and the particular methods of husbandry by which they are cultivated. Thus we have one, two, and three, or more *bout* ridges, according as the crops are grown to most advantage, on one or other of these sorts of small ridges, or as they suit the different sorts of tools by which they are put into the ground. Some other local modes likewise occur in tillage districts, of forming small ridges, for the cultivation of different kinds of crops. See **TILLAGE**.

RIDGES, in *Gardening*, portions of ground laid up by means of the spade in a narrow strip, to the height of one, two, or more feet, for the purpose of receiving the benefit of frosts and the influence of the atmosphere, and thereby become more mellow, light, and friable, as well as more fertile and productive. See **RIDGING**.

RIDGE-Work, in *Agriculture*, that sort of tillage which is executed

executed in the ridge method, or by raising the surface of the land into some kind of ridges.

RIDGES of a horse's mouth, are wrinkles or risings of the flesh in the roof of the mouth, running across from one side of the jaw to the other, with interjacent furrows.

It is commonly in the third or fourth ridge that the farriers strike with the horn, in order to bleed a horse whose mouth is overheated.

RIDGIL, in *Rural Economy*, a male sheep, in which the testicles do not come properly down into the scrotum.

RIDGIL Lambs, such as have none, or only one testicle, in the scrotum or cod. There is often great trouble and danger in these sorts of animals being mixed with other sheep stock, as they not only tease the ewes, but frequently injure them. The lambs should, of course, always be cut while young, as from six to ten or twelve weeks old, though the operation may be performed with safety at a much later period, and even when a year or more old. Mr. Marshall, in his *Norfolk Economy*, describes the manner of doing it in this way, where only one of the testicles had come down or entered the cod. Having cut off the end of the scrotum, bag, or cod, the testicle was drawn out in the usual manner of gelding. The other was taken out at the side contrary to that on which the palpable testicle was placed. In performing which, the lamb is laid flat on its side upon the ground, being held in that position by one man, keeping its neck and fore legs close down, while another stretches it out by drawing the hind legs backwards, keeping them tight down, so that the animal cannot stir. The operator then clips off a small patch of wool, about the size and shape of a duck's egg, close below the loin, and in the middle between the huckle and the short ribs; after which he makes an incision, sufficiently wide to admit his forefinger, with which he searches for the stone and brings it out, disengaging it from the tunic or coat in which it is enclosed by a knife, drawing out the cord or string. The orifice after this is carefully sewed up, and the wounded parts anointed with elder or some other ointment.

And it is stated as remarkable, that the concealed testicles all laid on the same side, namely the right side; the contrary side to that on which females are cut, in the cases he had the operation performed in. And that in one the operation was rendered difficult by the testicle being very small, and braced up close to the vertebrae. It is likewise added, that the palpable testicle being priorly extracted, increases the difficulty of the operation, as the person who performs it does not know which side to cut on, and is sometimes obliged to cut on both before he finds the concealed testicle.

This is a nice operation, which requires much care and attention in the person who performs it.

RIDGING of Ground, in *Gardening*, the practice of throwing it up into high ridges in order to lie fallow in winter, &c. to mellow, and improve in its quality and fertility.

It may be noticed, that this is a work of great utility in the kitchen garden, as well as in other parts, but more especially in stiff heavy soils, and cold wet lands. It is accomplished by trench-digging the ground over, laying the earth of each trench in a raised, rough ridge, lengthways, that by thus lying as high, open, and hollow as possible, it may meliorate and fertilize more effectually by the weather during the winter. And it receives further improvement from the levelling it down again, which is expeditiously effected, for the reception of the intended seeds, plants, roots, &c. which breaks, divides, and pulverizes the earth still more effectually.

And this sort of ridging is generally performed, either in

the latter end of autumn, or any time in winter, or early in the spring, as the ground is the most vacant at those seasons, and not generally immediately wanted for any principal sowing or planting.

This sort of work is executed by beginning at one end of the plat of ground, and digging out a trench one or two spades in width, and a full spade's depth, removing the crumbs from the bottom, in the lengthways across the ground, and wheeling the earth to the finishing end, to be ready to fill up the last trench: so marking out a second trench close to the first, of the same width, then proceeding in the trenching and ridging, previously paring the top of the second trench, with all weeds, rubbish, or dung thereon, if any, into the bottom of the first, and then digging the ground of the second along regularly, the proper width and depth as above; turning the earth spit and spit into the first open trench, laying it in a raised ridge lengthways thereof, without breaking it fine, so that it may lie somewhat rough and hollow, according as the nature of the soil may admit: proceeding thus with another trench in the same manner, and continuing the same with the whole, trench and trench, to the end of the plat of ground; filling up the last trench with the earth of the first opened, laying it now ridgeways, as in the preceding trenches.

But in the work of levelling down ridged ground, as wanted, it should proceed regularly, ridge and ridge, longways, levelling the earth equally to the right and left, loosening any solid parts, and breaking all large rough lumps and clods moderately fine; forming the whole in an even regular surface, in order for sowing and planting, as required.

And in general, it is not advisable to lay down more than can be sown the same or next day, while the surface is fresh stirred, especially in broad-cast sowing and raking in the seed, as, most generally, all tolerably light mellow soils are more yielding to the rake while the surface is fresh moved; or before rendered wet by rain, &c.; or very dry and hardened in the top earth by the sun, air, and winds, in dry weather, in the spring months, &c.; and likewise for sowing seeds by bedding in and covering in with earth from the alleys, &c. or with earth raked off the beds for that purpose, it would generally be most successful to perform it in a fresh stirred surface; though it is not so material in drill sowing; and besides, when seeds are committed to the earth, while it is in a fresh turned up surface, especially in a dry season, they are more forwarded in a free regular germination than in ground that has lain some time after digging or levelling down. Though some grounds, of a wet, or heavy, stiff nature, sometimes require to lie a few days after digging or levelling down, in order for the rough cloddy surface to mellow in some degree, either by drying a little, or by having a moderate rain, or sometimes both, to meliorate the lumpy clods, pliant to the rake, in the case of broad-cast sowing, and raking in the seed.

RIDGING-up, in *Husbandry*, a term used to signify the practice of laying up the mould or soil to the rows of particular sorts of crops, as those of the pea, potatoe, turnip, cabbage, and other similar kinds. It also implies the laying up land or earth in such a manner as that it may receive the most full and perfect benefit and influence of the atmosphere, and in consequence become in a mellow and pulverized state. It is often very necessary in stiff lands.

RIDGLET, in *Agriculture*, a provincial word, used to signify a small ridge, especially when raised by baulking or ridging up with the plough.

RIDGLING, in *Rural Economy*, the male of any beast that

that has been partially castrated, or which is not properly formed in the cod.

RIDICULE, in *Ethics*, is commonly used in the same sense with irrision; and has for its objects the absurdities and misfortunes of mankind. The latter, however, are very improper objects of ridicule, whose province should extend only to the carelessness, inconstancy, humour, affectation, impertinence, and in short all the lesser follies and imperfections of mankind. Such are generally the subjects of Horace's Satires; and Dr. More observes, that irrision, which is the parent of ridicule, was the original of satire.

Dr. Campbell (Philos. of Rhet. vol. i.) observes, that ridicule is not only confined to questions of less moment, but is fitter for refuting error than for supporting truth, for restraining from wrong conduct, than for inciting to the practice of what is right. It is not properly levelled at the *falsè*, but at the *absurd* in tenets; and it is not the criminal part of misconduct which it attacks, but that we denominate silly or foolish. With regard to doctrine, it is not fallity or mistake, but palpable error or absurdity (a thing hardly confutable by mere argument) which is the object of contempt; and consequently those dogmas are beyond the reach of cool reasoning which are within the rightful confines of ridicule. This statement is obviously inconsistent with the mode of arguing adopted (very improperly, as we conceive) by those who make ridicule, or raillery, the test of truth. To this class we may refer a noble writer, who, in his "Characteristics" (vol. i.) after alleging that truth may bear *all* lights, observes, that *one* of those principal lights or natural mediums, by which things are to be viewed, in order to a thorough recognition, is *ridicule* itself, or that manner of proof by which we discern whatever is liable to just raillery in any subject. So much, at least, is allowed by all, who at any time appeal to this criterion. His advocates, however, have asserted, that unjust representations have often been given of the positions which he has maintained in his "Essay on the Freedom of Wit and Humour," and it has been said, particularly in the "General Dictionary," that he was very far from vindicating a vague, indecent, and boundless ridicule, or inclined to employ his wit and humour otherwise than under certain restrictions, and when particular occasions called for and justified it. Although it be allowed, that his lordship has been in some instances misunderstood and misrepresented, and he has written in a manner so inaccurate and unguarded, as to have subjected himself to just animadversion and censure, Dr. Brown, in his "Essays on the Characteristics," has animadverted on his lordship's reasoning; and with great ingenuity contended, that though ridicule is a species of eloquence, reason alone is the detector of falsehood, and the test of truth; that ridicule can never pretend to this character; that it is one of the most powerful engines by which error can be maintained and established; and that its proper object is folly of conduct, and chiefly affectation. Other writers have defended his lordship, among whom we may reckon the Rev. Mr. Charles Bulkley, an ingenious and learned dissenting minister. In a work ascribed to Mr. Ramfay, the painter, the author has attempted to shew, that ridicule is of two kinds, and that it may be applied to opinions as well as to manners. The usual objects of ridicule are, indeed, certain improprieties and peculiarities of character and conduct, and to assert, in general, that it is the test of truth, is advancing a false position. Reason is undoubtedly the genuine and proper test of truth. Nevertheless, ridicule may in some cases be justly applied to opinions. There are tenets so flagrantly absurd, that it is not easy to refrain from viewing them in the light of humour and raillery, and perhaps the best way of exposing them may be to display

them in that light. Nevertheless, it must be acknowledged, that ridicule, when applied to grave and important subjects, is a very dangerous weapon; that it ought to be adopted with the utmost discretion, and that it has often been made use of in an improper manner.

With regard to conduct, says Dr. Campbell, we may discover to what kind ridicule is applicable, by directing our attention to the different departments of tragedy and of comedy. In the last it has a mighty influence: but into the first it never legally obtains admittance. Those things which principally come under its lash are awkwardness, rusticity, ignorance, cowardice, levity, foppery, pedantry, and affectation of every kind. But against murder, cruelty, parricide, ingratitude, or perjury, to attempt to raise a laugh, would shew such an unnatural insensibility in the speaker, as would be excessively disgusting to any audience. To punish such enormities, the tragic poet must take a very different route. It should be carefully remembered, says our author, that where nothing reprehensible, or supposed to be reprehensible, either in conduct or sentiment, is struck at, there is properly no satire (or, as it is sometimes termed, pointed wit), and consequently no ridicule. We may here observe, that the words "banter" and "raillery" are used to signify ridicule of a certain form, applied, indeed, more commonly to practices than to opinions, and oftener to the little peculiarities of individuals, than to the distinguishing customs or usages of sects and parties. The only difference in meaning between the two terms is, that the first generally denotes a coarser, the second a finer sort of ridicule; the former prevails most among the lower classes of the people, the latter only among persons of breeding. Dr. Campbell, after remarking that an air of ridicule in disproving or dissuading, by rendering opinions or practices contemptible, hath occasionally been attempted with approbation by preachers of great name, suggests the absolute necessity, in the use of it, of the greatest care and delicacy, that it may not degenerate into a strain but ill adapted to so precious an occupation.

Our author cites the authority of Aristotle in favour of the general principles with regard to the subject of ridicule which he has endeavoured to establish. "The ridiculous," says the Stagyrice, "implies something deformed, and consists in those smaller faults, which are neither painful nor pernicious, but unbeseeming: thus a face excites laughter, in which there are deformity and distortion without pain." Aristotle here speaks of ridicule, not of laughter in general; and not of every sort of ridicule, but solely of the ridiculous in manners, of which he has, in few words, given a very apposite description. Laughter is not his theme, but comedy and laughter, only so far as comedy is concerned with it; and the concern of comedy reaches no farther than to that kind of ridicule which relates to manners. For an account of Hobbes's theory of laughter and Dr. Campbell's objection to it, see LAUGHTER.

On the subject of laughter, Dr. Hartley (Obs. on Man) remarks, that young children do not laugh aloud for some months. The first occasion of doing this seems to be a surprise, which brings on a momentary fear first, and then a momentary joy, in consequence of the removal of that fear, agreeably to what may be observed of the pleasures that follow the removal of pain. This may appear probable, inasmuch as laughter is a nascent cry, stopped of a sudden; and also because, if the same surprise, which makes young children laugh, be a very little increased, they will cry. As children learn the use of language, they learn to laugh at sentences or stories, by which certain alarming notions and expectations are raised in them, and again dissipated instantaneously.

taneously. Children, and young persons, are diverted by every little jingle, pun, contrast, or coincidence, which is level to their capacities, even though the harshness and inconsistency, with which it first strikes the fancy, be so minute, as scarcely to be perceived. And this is the origin of that laughter which is excited by wit, humour, buffoonery, &c. The most natural occasions of mirth and laughter in adults seem to be the little mistakes and follies of children, and the smaller inconsistencies and improprieties, which happen in conversation in the daily occurrences of life; inasmuch as these pleasures are; in great measure, occasioned, or at least supported, by the general pleasurable state, which our love and affection to our friends in general, and to children in particular, put the mouth and body into. For this kind of mirth is always checked where we have dislike; also where the mistake or inconsistency rises beyond a certain limit; for then it produces concern, confusion, and uneasiness. This account of the original of laughter, and also of its salutary effects which the author mentions, both with respect to the body and mind, is inconsistent with Hobbes's theory, to which we have above referred. The laughter of pride and contempt, and the ridicule connected with it, are very different, not only in their origin, but in their influence.

RIDICULE, in a *Comedy*. See COMEDY.

RIDICULI AEDICULA, or the *Chapel of Laughter*, in *Roman Antiquity*, was a building erected at Rome, about two thousand paces beyond the gate Capena, in memory of the flight of Hannibal from the siege of the city, on account of the ruin and tempest that befel him on that occasion. The Romans, in ridicule of his flight, built and consecrated this chapel.

RIDING, a corruption of *tribing*, a division of Yorkshire, of which there are three; *viz.* the East-riding, West-riding, and North-riding.

In indictments, in that county, it is necessary that the town and riding be expressed. See REGISTER.

RIDING *Academy*. See ACADEMY and MANEGE.

An academy for riding was founded in this country, by king William III. See RIDE.

RIDING *Armed*, with dangerous and unlawful weapons, is an offence at common law. (4 Inst. 160.) By the statute 2 Edw. III. cap. 3. none shall ride armed by night or day, to the terror of the people; or come with force and arms before the king's justices, &c. doing their office, upon pain to forfeit their armour, and suffer imprisonment at the king's pleasure; and a fine may be set upon them by the justices, by 20 Ric. II. cap. 1. And no person can excuse the riding armed, in public, by alleging that he wears armour for his defence against an assault; but men may wear common arms, according to their quality and the fashion, and have attendants with them armed agreeable to their characters: also persons may ride or go armed to take felons, suppress riots, execute the king's process, &c. 3 Inst. 162.

RIDING *Cast*, in *Husbandry*, a term used by the farmers for a particular method of sowing their grounds, by making two casts upon the ground at the same time. This is not much used, but it is a quicker way than the double cast, which is the method now most used. Plot's Oxfordshire, p. 251.

RIDING-*Clerk*, one of the six clerks in chancery, who in his turn, for one year, keeps the controlment-books of all grants that pass the great seal that year. Blount.

RIDING-*Bits*, in *Ship Building*, are the largest bits in a ship, and those to which the cable is fitted when she rides at anchor.

RIDL, in *Geography*, a town of Austria; 10 miles S.S.W. of Aigen.

RIDLEY, NICHOLAS, in *Biography*, an eminent English prelate, and martyr to the cause of the reformed religion, descended from an ancient family in Northumberland, was born early in the 16th century. As he exhibited early proofs of good natural abilities, he was placed in a grammar-school at Newcastle-upon-Tyne, in which he made such progress, that he was taken from thence and entered of Pembroke-hall, Cambridge. This was about the year 1518. In 1522 he was admitted to the degree of B.A.; and in 1524 he was elected a fellow of his college. In the following year he commenced M.A.; and having been ordained priest, he went, for farther improvement, to the Sorbonne at Paris; and from thence to Louvain; continuing on the continent till the year 1529. He had been brought up, and continued a zealous Papist; but on his return home, he applied with great diligence to the reading of the scriptures, as the safest guides in his theological studies. In 1533 Mr. Ridley was chosen senior proctor of the university; and while he continued in this office, the point of the pope's supremacy was brought before the university, to be examined upon the authority of scripture. No one was better qualified to give an opinion on this subject than Mr. Ridley; and after much public disputation, the university came to the following resolution: "That the bishop of Rome had no more authority and jurisdiction derived to him from God, in this kingdom of England, than any other foreign bishop;" and this was officially signed by Mr. Ridley, as well as by the vice-chancellor and the other proctor. In the year 1536, his well-known learning and talents procured him a powerful patron in archbishop Cranmer, who took him into his family, and made him his chaplain. He had, probably before this, abandoned the principles in which he had been educated; and being, in 1538, presented by the archbishop to the vicarage of Herne, in East Kent, he preached certain doctrines attached to the reformation, but nevertheless still adhered to the doctrine of transubstantiation. Among other converts whom he made to his own opinions was lady Fiennes, who proved a distinguished ornament to the cause which she adopted. To excite or enliven the devotion of his parishioners, he had the "Te Deum" sung in English, which was afterwards made the subject of an accusation against him. In 1539, when the act of the six articles was passed, he bore his testimony against it, though he himself was not likely to be affected by the penalties of the statute. In 1540 he went to Cambridge, and proceeded doctor in divinity; and soon after he was chosen to the mastership of Pembroke-hall. About the same time he was, through the influence of the archbishop, nominated chaplain to the king; and this honour was speedily followed by his collation to a prebendal stall in the cathedral church of Canterbury. In this city, when his duty called him to preach, he endeavoured with all his talents to expose to the people the abuses of Popery; which gave so much offence, that charges were exhibited against him for preaching contrary to the statute of the six articles. The attempt, however, of involving him in the penalties of the law, completely failed. Gardiner, bishop of Winchester, next endeavoured to entrap him; and articles were exhibited against him before the justices of the peace in Kent, and afterwards before the king and council, which charged him with preaching against auricular confession, and with directing the Te Deum to be sung in English. The accusation was fortunately referred to Cranmer, by the king, who immediately crushed it, much to the mortification of Dr. Ridley's enemies. About the year 1545 he

he began to examine the doctrine of transubstantiation, which he and his friend and patron, Cranmer, rejected as unscriptural. Towards the close of the year he was appointed prebend of St. Peter's, Westminster. It 1547 he was promoted to the bishopric of Rochester; and in the following year he was employed in reforming the liturgy, in conjunction with Cranmer, five other prelates, and some learned divines; and in 1549 he was appointed one of the commissioners empowered to search after all Anabaptists, heretics, and contemners of the book of common prayer. In this character he was involved in the foul reproach of having contributed to bring to the stake Joan Bocher, and others. (See CRANMER.) That he did this from conscientious motives, there can be no doubt; but he ought to have investigated the principles, before he proceeded to the horrid act of persecution; and having a mind open to conviction, he would soon have found that no tenets, inculcated by the mild and holy Jesus, would lead to the infliction of corporal punishment for the sake of curing mental error. He more than once opposed the unreasonable commands and wishes of those in power; and would no doubt, in the case of Bocher and others, have done so too, had he felt it his duty.

The bishop of Rochester was one of the commissioners appointed to sit in judgment on the cause of Bonner, bishop of London; and by him the sentence of deprivation was pronounced against the prelate. This was in the reign of Edward. In that of Mary, as we shall see, ample revenge was taken of him. Ridley succeeded to the bishopric of London in the year 1549-50, when the bishopric of Westminster was suppressed as a distinct see, and united to that of London. Ridley's conduct towards his predecessor Bonner, and his family, after taking possession of the episcopal palace, was honourable to his integrity and benevolence, of which the following facts are sufficient proofs. He took care to preserve from injury the goods, &c. belonging to Bonner, allowing him full liberty to remove them when he pleased. Such materials as Bonner had purchased for the repair of his house and church, the new bishop employed to the uses for which they were designed; but he repaid him the money which he had advanced for them. He took upon himself the discharge of the sums which were due to Bonner's servants for liveries and wages; and that the mother and sister of that prelate, who lived near the palace at Fulham, and had their board there, might not be losers in consequence of his promotion, he always sent for them to dinner and supper, constantly placing Mrs. Bonner at the head of the table, even when persons of high rank were his guests.

Soon after his translation to the see of London, bishop Ridley was nominated one of the commissioners for examining Gardiner, bishop of Winchester, and concurred in his deprivation. In 1550 bishop Ridley visited his diocese, and he directed that the altars should thenceforth be taken down in the churches, and tables substituted in their room, for the celebration of the Lord's supper; to take away the false persuasion which the people had, of sacrifices to be offered upon altars. In 1551 the sweating sickness prevailed in London, and in the space of a few days carried off eight or nine hundred persons; but in the midst of the alarm which this necessarily occasioned, Ridley administered in the duties of his office, trusting himself entirely to the good providence of God for safety, in the danger to which he was every moment exposed; and he endeavoured, with all the zeal of an exemplary spiritual pastor, to improve the public calamity to the reformation of the manners of the people. To promote more generally a reformation in the

doctrine of the church, the council, this year, appointed Cranmer and Ridley to prepare a book of articles of faith. With this view they drew up forty-two articles, and sent copies of them to the other bishops and learned divines, for their corrections and amendments; after which the archbishop reviewed them a second time, and then presented them to the council, where they received the royal sanction, and were published by the king's authority, as an act of the supremacy. In the year 1552 he paid a visit to the princess Mary, and offered to preach before her; but she refused to hear him herself, or permit her servants to attend to his doctrine; telling him, that, in her father's days, he would not have dared to have avouched that for God's word that he then did. Mary never forgot nor forgave this interference on the part of the prelate, which, notwithstanding the remarks of most of Ridley's biographers, appears to us to have been uncalled for, if it were not even an act of rudeness not easily justified.

When the parliament assembled in 1553, the king, who was languishing under the decline which soon put an end to his life, ordered the two houses to attend him at Whitehall, where bishop Ridley preached before him, recommending with such energy the duties of beneficence and charity, that his majesty sent for him, to inquire how he could best put in practice the duties which he had so well and so strongly enforced; and the result of this sermon and conference was a determination in the king to found, or incorporate anew, and endow with ample revenues, those noble institutions, Christ's, Bartholomew's, Bridewell, and St. Thomas's hospitals.

Upon the death of Edward VI., Ridley was earnest in attempting to set lady Jane Grey on the throne; but when the design had miscarried, he went to Mary to do her homage, and submit himself to her clemency. His reception was such as he might have expected: he was immediately committed to the Tower, where, however, he was treated with much less rigour than Cranmer and Latimer, who were likewise prisoners in the same fortrefs. Ridley, it has been thought, might have recovered the queen's favour, if he would have brought the weight of his learning and authority to countenance her proceedings in religion. He was, however, too honest to act against his conviction; and he was, after eight months' imprisonment in the Tower, conveyed from thence to Oxford, where he was, on the 1st of October 1555, condemned to death for heresy. During the fortnight between his condemnation and execution, the priests tried all their means of persuasion to gain him over to their cause. He was deaf to their remonstrances, and was not to be shaken in the principles which he had adopted.

The 15th of October being the day appointed by the court for his execution, he met the trial with calmness and fortitude. He called it his marriage-day, and supped on the preceding evening with the utmost cheerfulness, having invited some friends on the occasion. When they rose to depart, one of them offered to sit up with him through the night, which he would not permit, saying, he meant to go to bed, and, by God's will, to sleep as quietly that night as he ever had done in his life. On the following morning, having dressed himself in his episcopal habit, he walked to the place of execution, between the mayor and one of the aldermen of Oxford; and seeing Latimer approach, from whom he had been separated since their condemnation, he ran to meet him, and with a cheerful countenance embraced him, and exclaimed, "Be of good heart, brother, for God will either assuage the fury of the flames, or else give us strength to endure them." Then walking to the stake, he

kneeled down, kissed it, and prayed with great fervour. A sermon was now preached, at the conclusion of which he was asked to recant; but he refused, and with a steadfast voice cried out, "May God's will be done." He was then stripped to his shirt, and fastened by an iron chain to the same stake with bishop Latimer. Every thing being ready, a kindled faggot was laid at Ridley's feet, who, when he saw the fire flaming up towards him, with a loud voice commended his soul to God. Latimer's sufferings were soon at an end, but Ridley endured the agonies of dying a much longer time, till they were terminated by the explosion of a bag of gunpowder, which had been suspended from his neck: after this he discovered no signs of life. Such was the end of bishop Ridley, who was unquestionably one of the most eminent instruments in promoting the cause of the reformation. In private life he was a pattern of all the virtues. His temper was excellent; his manners very affable and agreeable; and of the benevolence of his heart he gave abundant proofs, in his extraordinary liberality to the poor. He was unquestionably a man of great learning, and was author of a number of works. Many of his letters have been published by Fox, in his "Acts and Monuments;" and may likewise be seen in Glotter's Life of Bishop Ridley, to which, to Wood's Athen., and Neal's Hist. of the Puritans, our readers are referred.

RIDLEY, Sir THOMAS, a learned civilian, of the same family as the preceding, was born at Ely, and educated first at Eton, and then at King's-college, Cambridge. He afterwards became a master in chancery, and vicar-general to the archbishop of Canterbury. He died in 1628, and was author of "A View of Civil and Ecclesiastical Law."

RIDLEY, GLOSTER, of the same family with the preceding, was born in 1702, on board the Gloucester East Indiaman, whence he derived his name. He was educated in school-learning at Winchester; from which place he was removed to New-college, Oxford, where he laid the foundation for those acquirements, by which he was afterwards distinguished as a poet, historian, and divine. He obtained some preferment in the church; and in 1740 and 1742 he preached eight sermons at lady Moyer's lecture, which were published. In 1763 he published the "Life of Bishop Ridley," to which we have referred; and shortly after, "A Review of Philips's Life of Cardinal Pole." In reward for his labours in this controversy, and in another which Mr. Archdeacon Blackburn's Confessional produced, he was presented by Secker to a golden prebend at Salisbury. He died in 1774, leaving a widow and four daughters, one of whom, Mrs. Evans, published several novels. In the latter part of his life he lost two sons, young men of considerable talents. The elder, James, was author of "The Tales of the Genii;" a humorous paper, called "The Schemer," afterwards collected into a volume; "The History of James Lovegrove," and several other literary pieces. Two poems by Dr. Ridley, one styled "Jovi Eleutherio, or an Offering to Liberty;" and the other entitled "Psyche," were printed in Doddsley's Collection. "Melampus," the sequel of the latter, was printed by subscription. His transcript of the Syriac Gospels was published with a Latin translation, by professor White, in 2 vols. 4to. Gen. Biog.

RIDLEY, in *Geography*, a township of America, in Delaware county, Pennsylvania, containing 991 inhabitants.

RIDOLLY, a town of Hindoostan, in the subah of Agra; 35 miles S. of Agra.

RIDZIN. See **REUSSIN**.

RIE, in *Rural Economy*, a provincial term, applied to the operation of turning grain in a sieve, so as to bring the

capas into an eddy at the top. It is performed by a particular kind of circular motion.

RIEBACH, in *Geography*, a town of Germany, in the county of Hohenloe; 7 miles S.S.E. of Weichenheim.

RIEBECK-CASTEEL, or the castle of Van Riebeck, one of the divisions in the district of Stellenbosch and Drakenstein, in the Cape district, Southern Africa, which may be considered as a prolongation of the *Paardeberg* (which see), terminating to the northward in a high rocky summit. It took its name from the founder of the colony having travelled to this distance from the Cape, which is about 60 miles, and which, in that early period of the settlement, was as far as it was considered safe to proceed, on account of the numerous natives, whose race has now almost disappeared from the face of the earth. The produce is the same as that of Paardeberg, in both which there are as many corn-farms as freehold estates.

RIEBEN, a town of Brandenburg, in the Middle Mark; 3 miles S. of Belitz.

RIECHENAU, a town of the country of the Grisons; 9 miles S.S.W. of Coire.

RIED, a town of Bavaria; 18 miles S. of Passau.—Also, a town of Bavaria, in the principality of Aichstatt; 4 miles S.E. of Harrieden.

RIEDEN, a town of Germany, belonging to Anspach, insulated in the principality of Culmbach; 22 miles N. of Anspach.—Also, a town of Bavaria, in the Upper Palatinate; 9 miles S. of Amberg.

RIEDENBURG, a town of the bishopric of Passau, on the Inn; 12 miles S.S.W. of Passau.—Also, a town of Bavaria, on the Altmuhl; 17 miles N.E. of Ingolstadt.

RIEDLIN, VITUS, in *Biography*, a distinguished German physician, was born at Ulm in March, 1656, where many of his ancestors had practised the same profession with considerable repute. He obtained his early education principally at his native city, and terminated his studies by going to Tuningen in 1674, where he made great acquisition, during a residence of two years, and afterwards into Italy; and he graduated at Padua, about the end of the year 1676. He wished to have resided longer at this distinguished university; but his father having died in his boyhood, he was unable to procure the necessary means, and therefore he returned to Ulm in the following year. In 1679 he was elected a member of the college of physicians at Augsbourg, where he settled, and obtained a considerable share of practice among the first people; but on the pressing solicitations of his countrymen, he returned to Ulm in 1704, and remained there, in the enjoyment of extensive reputation, till his death, which took place in 1724. His principal work is entitled "Lineæ Medicæ, continentes Observaciones, Historias, Experimenta, Cauteles, &c. à Menfe Januario 1695 ad Mensum Junium 1700," in ten small volumes. It is a sort of journal, in which he not only recorded his own observations, but those of others. It does not, however, commend itself by much originality or good method. Eloy Di& Hist.

RIEDLINGEN, in *Geography*, a town of Wurtemberg; 27 miles S.W. of Ulm. N. lat. 48° 11'. E. long. 9° 30'.

RIEFF. See **RIVA**.

RIEGEL, HENRY JOSEPH, in *Biography*, a musician born at Wertheim, in Franconia, in 1741. M. Laborde does him the honour to call him a French composer. He studied music under Jomelli, at Stutgard, and was recommended by Richter to complete the musical education of a young lady of rank in France; which having finished, he established himself at Paris in 1765. His passion for the

harpichord confined his studies chiefly to that instrument for a considerable time; but after having acquired a distinguished reputation for his execution, he attended scholars, and applied to composition. Besides many quartets, concertos, sonatas, duos, &c. he composed symphonies à grand orchestra, which had considerable success at the concert of amateurs. He gained reputation by a French oratorio, "The Flight from Egypt," the first work of that kind that was executed at the Concert Spirituel, where it was well received for four successive years. A second oratorio, "The Taking of Jericho," had likewise merited applause.

His comic opera, "The Cobler and Financier," was at first represented at court, but afterwards well received in the capital, at the Italian theatre, though not performed by the best actors.

What characterizes his compositions is the great purity of his harmony. His effects are ingenious: in his capital pieces of symphonic composition, there is always a natural and regular melody. This composer, passionate for his art, enjoyed, free from envy, the talents of others. An enemy to cabal, he was exclusively attached to no kind of style; but enjoying whatever was good in all styles, (French, Italian, German,) he was one of the few foreigners who did the most honour to the profession in France. Laborde.

RIEHEN, in *Geography*, a town of Switzerland, in the bishopric of Bâle, and principal place of a bailiwick; 3 miles E. of Bâle.

RIELVES, a town of Spain, in New Castile; 11 miles N.W. of Toledo.

RIEMLING, in *Ichthyology*, a name given by several to the small fresh-water fish, called by the Latins *pinus*, and vulgarly the *pink*.

RIENECK, in *Geography*, a town and citadel of Germany, and capital of a county of the same name, on the Sinn; 36 miles E. of Frankfort on the Maine. N. lat. $50^{\circ} 11'$. E. long. $9^{\circ} 47'$.

RIENS ARREAR, in *Law*, a kind of plea used to an action of debt upon arrearages of accounts; by which the defendant alleges, that there is nothing in arrear.

RIENS *passé par le fait*, nothing passes by the deed, is the form of an exception taken in some cases to an action.

RIENS *par descent*, nothing by descent, is the plea of an heir, when sued for his ancestor's debt, though he had no lands from it by descent, nor has assets in hand.

RIENTZ, in *Geography*, a river of the county of Tyrol, which joins the Eysach, at Brixen.

RIENZI, in *Biography*. See GABRINI.

RIER, or REER-COUNTY, *Retro-comitatus*, in *Law*, is used in the statute of Weilm. 2. c. 39. 2 Edw. III. cap. 5. and in our law-books, in opposition to *open county*.

This appears to be some public place, which the sheriff appoints for the receipt of the king's money, after the end of the county-court. Fleta says it is *dies crastinus post comitatum*.

RIERSDORFF, in *Geography*, a town of Austria; 3 miles W. of Mauttern.

RIESENBERG, a town of Prussia, in the province of Oberland; 18 miles S.W. of Königsberg. N. lat. $53^{\circ} 43'$. E. long. $19^{\circ} 24'$.

RIESENKOPPE, or SCHNEE, a mountain of Silesia, and one of the most elevated in Europe, in the principality of Jauer.

RIESSA, a town of Saxony, in the margraviate of Meissen, on the Elbe; 12 miles N.W. of Meissen. N. lat. $51^{\circ} 18'$. E. long. $13^{\circ} 15'$.

RIETBERG, a town of Germany, and capital of a county of the same name, on the Embs, which county is

about 18 miles long and 6 broad; 12 miles W.N.W. of Paderborn. N. lat. $51^{\circ} 55'$. E. long. $18^{\circ} 32'$.

RIETI, a town of Italy, in the duchy of Spoleto, the see of a bishop; containing, besides the cathedral, three collegiate and six parish churches, and 12 convents. In the year 1785, it was much damaged by an earthquake; 25 miles E.S.E. of Spoleto. N. lat. $42^{\circ} 44'$. E. long. $12^{\circ} 56'$.

RIEV VOLODIMEROV, a town of Russia, in the government of Tver; 64 miles S.W. of Tver. N. lat. $56^{\circ} 5'$. E. long. $34^{\circ} 44'$.

RIEUMS, a town of France, in the department of the Upper Garonne, and chief place of a canton, in the district of Murat; 9 miles S.W. of Murat. The place contains 1425, and the canton 6316 inhabitants, on a territory of 200 kilometres, in 15 communes.

RIEUPEIROUX, a town of France, in the department of the Aveyron, and chief place of a canton, in the district of Villefranche; 15 miles W. of Rodes. The place contains 1752, and the canton 6299 inhabitants, on a territory of $182\frac{1}{2}$ kilometres, in 13 communes.

RIEUX, a town of France, and principal place of a district, in the department of the Upper Garonne; and before the revolution, the see of a bishop; 24 miles S. of Toulouse. N. lat. $43^{\circ} 15'$. E. long. $1^{\circ} 17'$.—Also, a town of France, in the department of the Morbihan; 10 miles S.E. of Rochefort.—Also, a town in the department of the Ille and Vilaine, on the Vilaine; 6 miles S. of Redon.—Also, a town in the department of the Aube; 10 miles E. of Carcassonne.

RIEZ, an old, populous town of France, formerly Civitas Reienfium, a bishop's see, and the seat of a council in 439, situated on a plain between the Aisne and Verdun, in the department of the Lower Alps, and chief place of a canton, in the district of Digne; 18 miles S. of Digne. The place contains 2784, and the canton 9963 inhabitants, on a territory of 330 kilometres, in 14 communes. Its environs abound in wine and fruits.

RIEZE, a river of France, which runs into the Garonne, near Saverdun.

RIF, one of the largest provinces of the empire of Morocco, situate in that chain of mountains which forms a part of the Lesser Atlas. This province, the soil of which is stony, is bounded by that of Garet to the east, the Mediterranean to the north, on the coast of which is the ancient city of Gomera, and also Melilla and Veles de Pegnon, belonging to Spain; by the province of Garb to the west, and to the south by those of Shaus or Chaus, and Fez.

RIF. See BAHIRA.

RIF-DYKE, one of the smaller Orkney islands, east of North Ronaldsha. N. lat. $59^{\circ} 13'$. W. long. $2^{\circ} 17'$.

RIFENBACH, a river of Germany, which runs into the Inn, 2 miles N. of Kuffstain.

RIFFREDO, a town of Etruria; 20 miles N.N.E. of Florence.

RIFLE GUNS, in the *Military Art*, are those whose barrels, instead of being smooth on the inside, like our common pieces, are formed with a number of spiral channels, resembling female screws; except only that the threads or rifles are less deflected, making only one turn, or a little more, in the whole length of the piece. This construction of the barrel is employed for correcting the irregularity in the flight of balls from smooth barrels, of which we have mentioned several instances under our articles GUNNERY and PROJECTILES. It has, for instance, been found, from the experiments of Mr. Robins, that notwithstanding the piece was firmly fixed, and fired with the same weight of

RIFLE GUNS.

powder, sometimes the ball was deflected to the right, sometimes to the left; sometimes above, and at others below, the true line of direction. It has also been observed, that the degree of deflection increases in a much greater proportion than the distance of the object fired at: thus, at double the distance, the deflection of the ball from the line in which the piece is pointed is considerably more than double, and at treble the distance more than treble, what it was at first. Mr. Robins secured a musket barrel upon a block of wood, and firing it with a ball at a board of a foot square, at 60 yards distance, found that it missed the board only once in 16 successive discharges; yet when fired with a smaller charge, at the distance of 760 yards, the ball was thrown sometimes 100 yards to the right or left of the line in which it was pointed. The direction upwards and downwards was also found equally uncertain; the ball, in some discharges, having struck the ground 200 yards nearer the piece than it did at others.

It is not difficult to account for these irregularities: they doubtless proceed from the impossibility of fitting a ball so accurately to any plain piece, but that it will rub more against one side of the barrel than another, in its passage through it. Whatever side, therefore, of the muzzle the ball is last in contact with, on quitting the piece, it will acquire a whirling motion towards that side, and will be found to bend the line of its flight in the same direction, whether it be upwards or downwards, to the right or left; or obliquely, partaking in some degree of both; and after quitting the barrel, this deflection, which, though in the first instance it is but trifling and inconsiderable, is still farther increased by the resistance of the air; this being greatest on that side where the whirling motion conspires with the progressive one, and least on that side where it is opposed to it. Thus, if the ball, in its passage out, rubs against the left side of the barrel, it will whirl towards that side; and as the right side of the ball will, therefore, turn up against the air during its flight, the resistance of the air will become greatest on the right side, and the ball be forced away to the left, which was the direction it whirled in. If the axis, about which the rotatory motion of the ball is made, preserved its position during the whole flight, the deflection would be in the same direction from one end of the track to the other; though it is obvious, that the quantity of this deflection would still not be proportional to the distance: for if all resistance of the ball were to cease at any part of its flight, still the ball would necessarily pursue the line in which it then moved, and the deflection be double at a double distance, treble at a treble distance, and so on. But as this resistance does not cease, but continue to act upon the ball throughout its whole flight, (though less in the latter part of it than at the commencement, in consequence of the decrease of velocity,) it is obvious that the deflection of the ball will be accelerated at every instant, and consequently increase in a greater proportion than the distance; as we have seen it has been found to do, from the experiments above alluded to. It happens, however, from various accidental circumstances, that the axis of the ball's rotation frequently changes its position several times during the flight; so that the ball, instead of bending its course uniformly in the same direction, often describes a track variously contorted. So great, however, is the tendency of the ball to deflect itself against the side it rubs against, that it has been said, though we never saw the experiments authenticated, that a ball, when fired out of a barrel bent towards the left hand, (and which will, therefore, be thrown from the piece in the direction of the bend,) yet as the ball, in this case, will be forced to rub against the right side of

the muzzle, and thus turn its left side up against the air, so it will be found to alter its course during the flight, and bend towards the right hand, so as to fall a considerable way to the right hand of the line in which the piece was pointed.

It will readily appear, therefore, from what has been stated, that these variations will be more frequent and considerable when the ball runs very loose in the piece; or when, from any roughness on its surface, or on the middle of the barrel, a considerable degree of friction takes place between them. With a view to prevent friction, it has been proposed to grease the ball; but this we should imagine would be of very little service. All that can be done in a plain barrel is to have the balls cast very solid and true, and afterwards milled in the same manner as is now practised upon shot: the barrel also should be very smooth on the inside, and the ball fit it very accurately, so as to leave scarcely any windage: yet, with all these precautions, it is very difficult, we may say impossible, to prevent it entirely; for gravity will constantly act, and friction on the under side will naturally be occasioned by the weight of the ball. In fact, when we consider the causes of the aberration in the flight of balls, it will be pretty evident that the only means of correcting it is by preventing the ball from rubbing more against one side of the barrel than another in passing through it; and by giving to the bullet a motion which will counteract every accidental one, and preserve its direction, by making the resistance of the air upon the fore part continue the same during its whole flight; that is, by giving it a rotatory motion perpendicular to the line of direction. The contrivance for this purpose is called rifling, and consists of forming upon the inside of the barrels a number of threads and furrows, either in a straight or spiral direction, into which the ball is moulded, whereby any rolling motion along the sides of the barrel is effectually prevented.

The numbers of these threads in a gun are different, according to the fancy of the workman and the size of the barrel; and, in like manner, the depth to which these channels or rifles are cut down, is not regulated by any invariable rule; but differs according to the country where the work is performed, or the caprice of the artificer. There are also different methods of charging pieces of this kind, but the usual one is as follows: after the powder is put in, a leaden bullet, somewhat larger than the bore of the gun, is taken, and having greased it well, it is laid on the mouth of the piece, and rammed down with an iron rammer, hollow at the end; the softness of the lead giving way to the violence with which the bullet is impelled, that zone of the bullet which is contiguous to the piece, varies its circular form, and acquires the shape of the inside of the barrel, so that it becomes the part of a male screw, exactly fitting the indents of the rifle. And hence it happens that, when the piece is fired, the indented zone of the bullet follows the sweep of the rifles, and thereby, besides its progressive motion, acquires a circular one round the axis of the barrel, which motion will be continued to the bullet after its separation from the piece; by which means a bullet discharged from a rifled barrel is constantly made to whirl round an axis, which is coincident with the line of its flight. And hence it follows, that the resistance on the foremost surface of the bullet is equally distributed round the pole of its circular motion, and acts with an equal effort on every side of the line of direction, so that this resistance can produce no deviation from that line: and if, by the casual irregularity of the foremost surface of the bullet, or by any other accident, the resistance should be stronger on one side of

the pole of the circular motion than on the other; yet, as the place where this greater resistance acts must perpetually shift its position round the line, in which the bullet flies, the deflection, which this inequality would occasion, if it acted constantly with the same given tendency, is now continually rectified by the various and contrary tendencies of that disturbing force, during the course of one revolution; so that the ball will always go right forwards, and thus that deflection or deviation, already taken notice of under the article PROJECTILE, and in the preceding part of this article, will be prevented. This may be explained by the motion of an arrow; for if an arrow that is not feathered be shot from a bow, its motion will be very irregular; but when the feathers of the arrow are properly arranged in a spiral form, so as to make the arrow spin round its axis, it will always fly straight forward. Upon the same principle, every school-boy finds himself under the necessity of making his shuttle-cock spin, before he can depend upon the truth of its flight. Mr. Robins observes, that the actual motions of bullets discharged from rifled pieces correspond very well with these speculations. Although the use of pieces of this kind had long prevailed in Europe, particularly in Germany and Switzerland, the advantages resulting from them have been very imperfectly understood, and, as Mr. Robins observes, unaccountably misrepresented. The three following reasons have been constantly alleged in favour of this construction: either that the inflammation of the powder was greater by the resistance which the bullet thus forced into the barrel gave it, and that by it the bullet received a much greater impulsion than it would have done from the same quantity of powder in a common piece, or that the bullet, by the compounding of its circular and revolving motion, did, as it were, bore the air, and thereby flew to a much greater distance, than it would otherwise have done; or that, by the same boring motion, it made its way much easier through all solid substances, and penetrated much deeper into them, than if discharged in the common manner. But the ingenious writer just mentioned, satisfied himself by numerous experiments made with rifled barrels of various sizes, that none of these reasons hold true in the use of such pieces; but that the advantage of their construction results from its preventing the deflection of the ball, as we have above represented it. And that it produced this effect he found by observing, that the same hemisphere of the bullet which lies foremost in the piece, continued foremost during the whole course of its flight.

In Germany and Switzerland, an improvement is made in the method, already recited, of charging these pieces; especially those of the larger sort, which are used for shooting at great distances. This is done by cutting a piece of very thin leather, or of thin fustian, in a circular shape, somewhat larger than the bore of the barrel. This circular piece being greased on one side is laid upon the muzzle with its greasy parts downwards, and the bullet being placed upon it, is then forced down the barrel with it; by which means the leather or fustian incloses the lower half of the bullet, and by its interposition between the bullet and the rifles, prevents the lead from being cut by them. But in those barrels where this method is practised, the rifles are generally shallow, and the bullet ought not to be too large. The rifle-barrels, which have been made in England, where they are not very common, are contrived to be charged at the breech, the piece being, for this purpose, made larger there than in any other part. The powder and bullet are put in through the side of the barrel by an opening, which, when the piece is loaded, is filled up

with a screw. By this means, when the piece is fired, the bullet is forced through the rifles, and acquires the same spiral motion as in the former kind of pieces; other barrels unscrew at the breech, for the convenience of charging them. With regard to the defects of these rifled pieces, Mr. Robins observes, that if either the angle of elevation, or the curvature of the bullet's track through the air be great, the inclination of the axis round which it whirls will cause irregularities, which will often produce considerable deflections. Accordingly he proposes to make use of bullets of an egg-like form, instead of spherical ones, and to fire them with their broad ends foremost, that thus their longer axes may be always carried, by their centres of gravity, into the lines of their flight. Upon the whole, he concludes, that whatever tends to diminish the friction of these pieces, tends, at the same time, to render them more complete; and consequently the less the rifles are indented, the better they are, provided that they are just sufficient to keep the bullet from turning round in the piece. Besides, the bullet ought to be no larger than to be just pressed by the rifles, for the easier the bullet moves in the piece, supposing it not to shift its position, the more violent and accurate its flight will be. And to render them in this respect still more complete, the sweep of the rifles should be in each part exactly parallel to each other: for then, after the bullet is once put in motion, it will slide out of the barrel without any shake, and with a much smaller degree of friction than if the threads of the rifles have not all of them the same degree of incurvation. The foreigners are so exact in this respect, that they try their pieces, with a view to this particular, in the following manner: they first pour melted lead into them, and letting it cool, they procure a leaden cylinder of perhaps two or three diameters in length, exactly fitted to one part of the inside of the piece; then if this leaden cylinder, being gently pushed by the rammer, will pass from one end of the barrel to the other, without any sensible strain or effort, they pronounce the piece perfect; but if it any where sticks or moves hard they esteem it defective.

We have stated that some rifle-pieces are charged at the breech; these, however, are necessarily much dearer than the others, and excepting the expedition in charging them, are really inferior to those in which the ball is introduced at the muzzle, on which account they are not much employed at present, at least not in this country. The want of expedition in the charging pieces of this kind is, however, a very serious defect, to remedy which, it has been proposed to have the balls cast with projections upon them, in the same manner as described in the following article on RIFLE *Ordnance*. This may be done with great ease and accuracy, by making corresponding hollows round the zone of the bullet-mould; by this means the balls may be fitted so accurately to the rifles, as to leave scarcely any windage; while the friction will be less than it is either when the ball is put in at the breech, or forced in at the muzzle.

In treating of the causes of aberration in the flight of balls, we have supposed the air to be perfectly at rest; but it is evident that the force of the wind will affect balls considerably, whether they are fired from a plain or a rifle barrel; this effect, however, will be much less in the latter than in the former; but in neither case is it possible either to avoid it entirely, or to estimate the quantity of aberration that it may, under different circumstances, occasion.

Pieces intended for shooting with ball, whether they be plain or rifled, ought to be of much more equal thick-
ness

ness from the breech to the muzzle, than those that are intended for shot only. In every barrel there is an undulating vibration communicated to the metal by the explosion. This is most remarkable in a thin barrel, and when the charge is great, and in an equal degree, whether the piece be rifle or plain, and therefore ought to be equally attended to by gunsmiths in both cases. For more on the subject of rifle musket barrels, see Robius' Tracts, vol. i. p. 328, &c.; see also Nicholson's Philosophical Journal, vol. i. p. 382; and for rifle ordnance, see the Memoir of the National Institute mentioned in the following article.

RIFLE Ordnance. After the important advantages attending rifled barrel muskets were well understood, the idea naturally occurred of carrying the same improvements into cannons and field-pieces, and many experiments have been made with a view of constructing these on similar principles to the musket. The first attempt of this kind was made by Dr. Lind, and Capt. Alexander Blair, of the 69th regiment, in 1774. The pieces are of cast iron, and are not bored like the common cannon, but have the rifles moulded on their core, after which they are cleaned out, and furnished with the proper instruments.

Guns of this description, which are intended for the field, ought never to be made to carry a ball of above one or two pounds weight at most; a leaden bullet of that weight being sufficient to destroy either man or horse. A pound gun of this description, of good metal, need not weigh above an hundred weight, and its carriage about another hundred, and may therefore be easily transported from place to place by a few men, and a couple of good horses may transport six of these guns and their carriages, if put into a cart. But for other purposes, in which a greater momentum is necessary, there is nothing to prevent them being made of the usual calibre.

The following are the dimensions that have been recommended for these kinds of cannon. The length of the gun being divided into seven equal parts, the length of the first reinforce is two of these parts; the second reinforce $1\frac{5}{8}$ of the diameter of the calibre; the chase $3\frac{1}{8}$ diameter of the calibre. The distance of the hind part of the base ring to the beginning of the bore is $1\frac{3}{8}$ calibre. The trunnions are each one calibre in length, and the same in breadth; their centres are placed $\frac{3}{8}$ ths of the length of the gun from the hind part of the base ring, in such a manner, that the axis of the trunnions pass through the centre line of the bore, which prevents the gun from kicking, and breaking its carriage. The length of the cascable is $1\frac{1}{8}$ of a calibre.

The calibre of the gun being divided into 16 equal parts; then

The thickness of metal from the base ring to the bore, is	18.5
At the end of the first reinforce	17
At the same place for the beginning of the second reinforce	17
At the end of the second reinforce	15
At the same place for the beginning of the chase	13.75
At the end of the chase, or muzzle, the mouldings excluded	9
At the swelling of the muzzle	12
At the muzzle fillet	9.5
At the extreme moulding	8
Base ring	5.5
Ogee next the base ring	5.5
The astragal, or half round	4.75
Its fillet	1

Total astragal and fillets at the vent-field	4
First reinforce ring	4.5
Second reinforce ring	3.5
Its ogee	3
Its astragal	1.5
And its fillet	1
The muzzle, astragal and fillet	4
Breadth of the fillet at the base ring	1
Distance of the fillet at the button from the fillet at the base ring	5
Breadth of the fillet at the button	1
Diameter of the fillet at the button	18
Distance of the centre of the button from its fillet	12
Diameter of the button	18
Diameter of its neck	10.5

The vent should be placed about half an inch from the bottom of the chamber or bore, that the cartridge may be pricked, lest some of the bottom of the cartridges should be left when the gun is sponged, which might retard the firing till the ball be again drawn, which is very difficult in pieces of this kind.

The rifles in this gun make one spiral turn in the length of the bore, but go no nearer to the breech, in their full size, than two calibres, and terminate in a gentle slope in half a calibre more, so as not to prevent the cartridge, with the powder, from being easily sent home to the bottom of the gun, which would otherwise constantly happen with the flannel cartridges, and even sometimes with paper ones, if not made to enter very loosely. The shape of the rifles is femicircular, their breadth being equal to the diameter, which is $\frac{3}{8}$ ths of the calibre, and their depth $\frac{7}{8}$ ths of a calibre. The bullets are of lead, having six knobs cast on them, to fit the rifles of the gun; and being thus made of soft metal, they do not injure the rifles.

Rifle ordnance, however, of any calibre, might be made to carry iron shot for battering, or for other purposes; provided holes, that are a little wider at their bottoms than at their upper parts, be cast in a zone round the ball, for receiving afterwards leaden knobs to fit the rifles of the cannon; by which means the iron shot will have its intended line of direction preserved, without injuring the rifles more than if the whole ball was of lead, the rotatory motion round its axis, or the line of its direction, which corrects the aberration, being communicated to it by the leaden knobs following the spiral turn of the rifles in their progress out of the gun. It is particularly to be observed, that the balls must be made to go easily down into the piece, so that the cartridge with the powder, and the bullet, may be both sent home together with a single puff of the hand, without any wadding above either the powder or the ball, by which means the gun is quickly loaded, and the ball flies farther than when it is forcibly driven into the gun, as was found from many experiments. The only reason why, in common rifle muskets, the bullets are forcibly rammed in, is, that the zone of the ball which is contiguous to the inside of the bore, may have the figure of the rifles impressed upon it, in such a manner, as to become part of a male screw, exactly fitting the indents of the rifle, which is not at all necessary in the present case, the figure of the rifles being, in the first instance, cast upon the ball. These knobs retard the flight of the ball in some degree, but this small disadvantage is fully counterbalanced by the ease with which the gun is loaded, its service being nearly as quick as that of a common field-piece, and the retardation and quantity of the whirling motion which is communicated to the bullet being constantly the same, it will not in the least affect the experiments

ments made with them, in order to determine the resistance of the air.

The French, in the course of the late war, have made experiments on rifle ordnance of a different kind to that above explained; in which, in fact, the gun is of the usual form, the principal difference being in the nature and form of the ball, which M. Guyton (who has given an account of these experiments in vol. vii. of the National Institute of France) calls *bullets a bague de plomb*, which in form are cylindrico-spherical, the cylindrical part being next the charge. A rim of lead is fixed round the centre of the ball, rather exceeding the bore of the gun, which is cut off by the edge of the muzzle, in introducing the ball into the piece, whereby all the advantages of the rifle are obtained, although the rotatory motion above described, and which is supposed to have so great an influence on the direction, has not place in the present instance. According to M. Guyton's report, the accuracy in the rectilinear motion of these balls exceeded any thing before known in artillery practice; besides, that although the weight of the bullet was nearly double that of a common shot of a piece of the same calibre, the range in very few instances fell short of the common range, and in some even considerably exceeded it. The difficulty and time requisite in loading a gun with a ball of this kind, however, are so great, as, in our opinion, to render it useless, although it seems to have been recommended for adoption, in a few particular situations, by a committee of French artillery officers. In the course of the memoir in which the above experiments are detailed, M. Guyton mentions another kind of rifle cannon, invented by an Italian officer, which was found remarkably correct in projecting the ball in a right line. The bore of this gun is slightly conical, being greatest at the breech, where the piece is loaded by unfreewheeling the breech, as in some rifle muskets and pistols: the ball is of lead, which must necessarily, from the construction of the gun, change its form in passing through the bore. But this, as well as the one above-mentioned, seems to require too much time in loading to be ever adopted as regular pieces of ordnance.

RIFTS, in *Farriery*, are small cracks, clefts, chaps, or any other similar fissures or openings in the hoofs of horses' feet. See those heads.

RIG. See **RIDLING**.

RIG, in *Rural Economy*, a male sheep, with none, or one testicle only in the scrotum.

RIGA, in *Geography*, a sea-port town of Russia, formerly the capital of Livonia, now of the government of its own name, is situated in the gulf of Riga, and the see of an archbishop. This town derives its consequence from its situation on the Duna, which, being navigable from the frontiers of the government of Polotsk, brings the productions of the north-eastern parts of Poland and the western provinces of Russia, and has depth enough to receive, close to its walls, ships of burden, which sail to and from the Baltic. Next to St. Petersburg, it is the most commercial town in the Russian empire. The trade is chiefly carried on by foreign merchants, who reside in the town. Those of the English factory possess the greatest share of the commerce, and live in an hospitable, splendid manner. The principal exports are corn, hemp, flax, iron, timber, masts, leather, tallow; and the imports are salt, cloth, silks, wine, grocery, potash, and salted herrings. The masts trade is peculiarly beneficial to the town; the burghers of Riga send persons, who are called mast-cutters, into the Russian provinces, to mark the trees, which are purchased standing. They grow mostly on the districts which border

the Dnieper, are sent up that river to a landing-place, transported 30 versts to the Duna, are then formed into floats of from 50 to 200 pieces, and descend the stream to Riga. The tree which produces the largest masts is the Scotch fir. Those pieces which are from 18 to 25 inches in diameter, are called masts; under those dimensions, spars, or, in England, Norway masts; because Norway exports no trees more than 18 inches in diameter. The English merchants, who contract with government, buy the masts from the burghers of Riga, which are skilfully examined in order to ascertain their soundness, and are usually from 70 to 80 feet in length.

The hemp is brought from the Ukraine and Poland, and requires two years in its passage to Riga. The barks in which it is conveyed are from 250 to 300 tons burden, are covered with mats, sloping like a pent-house roof, and have a false bottom. They ascend the Dnieper and Duna; but on account of numerous shoals, can only pass the Duna in the spring, or about three weeks after the snow begins to melt, and if they miss that time, they are delayed till autumn. The hemp exported from Riga is generally more esteemed, and 30 per cent. dearer than that exported from Petersburg; the former comes from the Ukraine, the provinces of Mohile and Polotsk, and the neighbouring parts of Poland; the other from the governments of Tver and Novogorod. The Riga hemp is chiefly used for shrouds and stays of men of war, and procured by contract for the English admiralty and the East India company.

The inhabitants of Riga carry on also a considerable commerce in salt. They import it from Spain, and send it up the Duna, to supply the districts bordering on that river; and by land into Courland, and into the neighbouring provinces of Poland. This town, says Mr. Coxe, contains within the fortifications 9000 inhabitants, and in the suburbs 15,000, exclusive of a garrison of 1000 soldiers. According to Heym, the town and suburbs contain 14,280 males, and 13,516 females.

Over the Duna at Riga is a floating wooden bridge, 40 feet in breadth, and 2600 in length. A row of piles extends from one shore to the other; each pile is from 25 to 40 feet long, according to the depth of the river, and appears about four feet above the level of the water. To these piles the pons of the bridge are loosely fastened, by means of iron chains fixed to the transverse beams. The bridge rises and falls with the river; and, under the wheels of heavy-laden carriages, plays as if actuated by a spring. This is the fashionable walk, and is an agreeable busy scene, when crowded with people, and lined on each side with ships taking in or unloading their cargoes. In the beginning of winter, when the frost sets in, the bridge is removed; the piles, remaining in the water, are forced up by the ice, and conveyed to land; and the whole is laid down again in the spring.

Riga was built in the year 1200, and soon after inclosed by a wall. At different periods it hath suffered much by fires and sieges. N. lat. 56° 55'. E. long. 23° 54'.

RIGA, Ital., a line of the staff, in *Musick*; and speaking of music in general, the whole five lines, or staff, are called *una riga*.

RIGADON, **RIGODON**, and *Rigaudon*, a gay and lively dance, written all these several ways. Some say it came from Provence; but Rousseau affirms, that he has been told by an old dancing-master, that it had its name from its inventor, Rigaud.

At the beginning of the last century, there were three dances which every eminent master taught, and every noble-
man's

man's and gentleman's child learned, in the course of their education: these were the minuet, rigaudon, and l'ouvre, all natives of France, during the reign of Louis XIV.

The air to the rigaudon is always in jig time of $\frac{3}{4}$, beginning with an odd quaver. See DANCE, MINUET, and L'OUVRE.

RIGAL, in *Musfc.* See RIGOLL.

RIGAUD, HYACINTH, in *Biography*, was born at Perpignan, in Languedoc, in 1663, and was the son of Matthias Rigaud, a painter of some note, from whom, of course, he received his initiation into the myteries of his art. He had the misfortune to lose his instructor, when he was only eight years of age; and for a while, he was at the mercy of incapable masters. At length he became acquainted with a portrait-painter, of the name of Ranc, under whom he acquired considerable freedom of taste; and, after a few years, was enabled to produce works which rivalled those of his master, for truth, for liveliness, and expression.

He was impatiently desirous of visiting Italy, but was dissuaded from it by Le Brun, who advised him to continue at Paris, and study portraiture; by which he might assure himself of fortune and reputation: and his subsequent success proved the propriety and kindness of the advice. He soon distinguished himself by a richness and boldness of style, that induced the king of France, Louis XIV., to sit to him for his portrait; and in succession, he painted the princes of the blood, and prime nobility of the kingdom. Many foreign princes, nobles, and generals, also had their portraits from his hand; and he treated them with a splendour in composition, of which he is the inventor, and which unfortunately governed the French school of portrait-painters till the revolution. We say, unfortunately!—for though Rigaud managed it with great dexterity, yet not being founded in nature, it necessarily led to error. To produce superior grace, the actions of the figures are twisted, and too often distorted: they are engaged about trifles, with an air of immense importance; and the draperies arranged in flowing lines, which convey an idea of motion in substances which would require a gulf of wind to move them, while the wearers are tranquilly seated in splendid apartments, and under complete shelter. He died in 1743, at the advanced age of 80.

RIGAULT, NICHOLAS, was born at Paris in 1577, and was educated among the Jesuits, who in vain attempted to induce him to enter into their society. As a literary character, he made himself known by a satirical work, entitled "Funus Parasiticum," published in 1596; with which the celebrated de Thou was so much delighted, that he entrusted him with the education of his son. When the learned Casaubon, who had the care of the royal library, removed to England, Rigault succeeded him in that employment. His services were so well approved, that he was created attorney-general of the sovereign chamber of Nanci, counsellor to the parliament of Metz, and, finally, intendant of that province. He died at Toul in 1654, at the age of 77, with a character for generosity, modesty, and benevolence, that contributed as much to his reputation as his numerous writings. It was chiefly as an editor of Greek and Latin authors that he made himself known to the learned world. Of these were "Minutius Felix," 1643; "St. Cyprian," 1648; and "Tertullian," 1664; enriched with useful notes, corrections, and observations. He gave translations of the Greek writers, "Onofander," "Artemidorus," and others; and he edited, with notes, "Phædrus," "Martial," "Rei Agrariæ Scriptores," &c. He also wrote and edited some works on juridical subjects;

and he was appointed, together with Peter Dupin, by the will of the president de Thou, to give a complete edition of his history, which appeared at Geneva in 1620.

RIGEL, in *Astronomy* See REGEL.

RIGEL, or RIEGEL, ANTHONY, in *Biography*, a harpsichord master and composer. In 1780 he was at Spire, Mannheim, and Paris, where he published pieces for the harpsichord, with a violin accompaniment in duo, *a parte equali*; and afterwards capriccios for the harpsichord. His style is slight, with little invention, but not vulgar.

RIGG, in *Agriculture*, a provincial word, used to signify the same as ridge.

RIGGEN, in *Rural Economy*, the ridge of the roof of a building. See FARM-Building.

RIGGEN-Tree, the piece of timber laid along the ridge of a roof, to support the heads of the spars or rafters, which, in modern buildings, is found unnecessary.

RIGGIL. See RIG and RIDGIL.

RIGGING, a general name given to all the ropes employed to support the masts, and to extend or reduce the sails, or arrange them to the disposition of the wind.

The former, which are used to sustain the masts, remain usually in a fixed position, and are called *standing rigging*: such are the shrouds, stays, and backstays. (*Plate III. Rigging, fig. 1.*) The latter, whose office it is to manage the sails, by communicating with various blocks, &c. situated in different parts of the masts, yards, shrouds, &c. are comprehended in the general term of *running rigging*: such are the braces, sheets, haliards, clue-lines, brails, &c. (*Plate III. fig. 2.*)

The principal objects to be considered in rigging a ship appear to be strength, convenience, and simplicity; or the properties of affording sufficient security to the masts, yards, and sails; of arranging the whole in the most advantageous manner, to succour the masts, and facilitate the management of the sails; avoiding perplexity, and rejecting whatever is superfluous and unnecessary. The perfection of this art, then, consists in retaining all these qualities, and in preserving a judicious medium between them.

Rigging is in part prepared on shore, in a rigging-house, which has the following conveniencies, &c.; *viz.* at the upper end is a windlass; and at certain distances down the middle are two rows of large strong posts, for stretching ropes, and laying on service; and on each side of the house are births for the men to strop blocks, and prepare small rigging on.

There is much subordinate knowledge necessary, before a person can either prepare rigging in the house, or fit it on board the ship. This consists of *knottting*; as the overhand knot (*Plate I. fig. 1.*); reef-knot, *fig. 2*; bowline-knot, *fig. 3*; wall-knot, *figs. 4 and 5*; double wall-knot crowned, *fig. 6*; buoy-rope-knot, *fig. 7*; stopper-knot, *fig. 8*; diamond-knot, single, *fig. 9*; diamond-knot, double, *fig. 10*; shroud-knot, opened for knotting, *fig. 11*; as knotted, *fig. 12*; ends tapered and served, which completes it, *fig. 13*; tack-knot, *fig. 14*; sprit-sail sheet-knot, *fig. 15*.

Hitches.—Sheepshank, *fig. 16*; half-hitches, *fig. 17*; clove-hitch, *fig. 18*; rolling-hitch, *fig. 19*; midshipman's hitch, *fig. 20*; Blackwall-hitch, *fig. 21*; magnus-hitch, *fig. 22*; timber-hitch, *fig. 23*; racking-hitch, *fig. 24*.

Bends.—Sheet-bend, *fig. 26*; Carrick-bend, *fig. 27*; fisherman's bend, *fig. 30*; hawser-bend, *fig. 31*; temporary bend, *fig. 32*.

Gasket, *fig. 25*; outside-clinch, *fig. 28*; cat's-paw, *fig. 29*.

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Splices.—Eye-splice, ends opened, *fig. 33*; finished, *fig. 34*; short-splice, ends opened and laid together, *fig. 35*; finished, *fig. 36*; long-splice, ends opened and laid for splicing, *fig. 37*; finished, *fig. 38*; cunt-splice, ends opened and laid for splicing, *fig. 39*; finished and served over the splice, *fig. 40*; cable-splice for drawing, ends opened, tapered, and pointed, *fig. 41*; tapered short-splice, *fig. 42*. This splice is served all over the splice.

Hawser, the ends opened, *fig. 43*; tapered and pointed, *fig. 44*; ditto with a becket, *fig. 45*.

Worming, *fig. 46*; parling, *fig. 47*; serving, *fig. 48*; plating, *fig. 49*.

The ropes, &c. for the several parts of rigging are, in circumference and in length, according to the established dimensions for ships of every class, particularly in the navy.

There is no one undeviating mode which is pursued in the progressive rigging of ships. It is an operation which must at all times depend upon the time allotted for its performance, and the necessity of immediate fitting. The nature of it, however, is such, that all parts may be advancing at the same time, the lower masts and bowsprit being fixed.

Fore, main, and mizen masts, have girtline-blocks lashed round the mast-head, above the stop of the cap, one to hang on each side. The girtlines that reeve through them lead down upon deck, for hoisting the rigging, tops, &c. and the men employed to place the rigging over the mast-head.

Pendants of tackles are wormed, parcelled, and served with spun-yarn, in the way of the splice (which is to the size of the mast-head); they have large iron thimbles spliced into their lower ends; are then wormed, &c. as above, the whole length in the house; and are the first thing put over the mast-head, resting on the bolsters, they being first clothed with worn canvas several times doubled and tarred. Those over the mizen-mast are called burton-pendants, as 2, 3, *Plate III. fig. 1*.

Shrouds.—The cabling is warped round two iron fids fixed in the floor, distant from each other the length of the first warp; that is, from the top of the bolster to the foremost dead-eye; one end of the cabling is made fast to the lower fid, and the remainder passed round the upper fid; and so on alternately, one turn close to the back of another. The additional length, gained by the turns lying round each other, is sufficient for the lengthening of each pair of shrouds, as they rake aft. When the whole gang of shrouds is warped out, the bights at the lower end are cut through, in a straight direction, with the fids.

Brigs have four pair of shrouds forward, and the foremost shroud and pendant are in one. The upper bights are designed for the eyes, and the outer turns are called *swifters*, and are left from four to five feet at each end longer than the shrouds, and have an eye spliced in them to the size of the mast-head.

The shrouds, when cut to their length, are stretched for worming by the windlass and tackle, and then wormed with double spun-yarn one-fourth the length from the centre of the eye on each side: but the fore leg of the foremost pair is wormed all the whole length. Each length, after being wormed, is hove out, till each pair has acquired, by stretching, one and a half the length of the eye; and should remain on that stretch twenty-four hours, before the service is laid on.

The eyes of all shrouds are parcelled with worn canvas, well tarred, about one fathom and a half on each side of the middle for large ships, and proportionably for smaller; and then served with spun-yarn one-fourth of their length; each

turn of the serving is laid very close, and strained tight round, to prevent the water penetrating. The fore leg of the foremost pair of shrouds is served the whole length.

Swifters, when stretched, have the length of the splice set off on each side of the middle, and likewise the length of the eye, or circumference of the mast-head. The latter is parcelled and served as above. They are then cut asunder in the middle, and spliced to the circumference of the mast-head; then got on the stretch, and served over the splice one-fourth of the length.

The bights of shrouds are seized together to the circumference of the mast-heads, 1, 2, (*Plate II. figs. 14 and 15*); the seizing of the first shroud is put on below the bolster or trestle-trees, with seven under and six riding turns, and a double cross over all. The seizing of each shroud is to be laid its breadth below the next, and clear of each other, to prevent chafing.

Thus far the shrouds are prepared in the house: they are next hoisted over the mast-head. The first pair leads down on the starboard side forward; the next pair forward on the larboard side; then the second pair on the starboard, and the second on the larboard, and so on, till all are fixed. By this method, the yards are braced to a greater degree of obliquity, when close hauled; which could not be were the foremost shrouds last fitted on the mast-head.

Swifters (which are the after shrouds) are swayed next over the mast-head above the shrouds, and are fixed on the starboard and larboard sides of the ship, to support the masts, and enable them to bear the strain of a heavy press of sail; as 4, 5, 6, *Plate III. fig. 1*.

Stays have an eye spliced in one end, 1, (*Plate II. fig. 16*.) sufficiently to receive itself through. Each stay is got on the stretch, and hove well out, as the shrouds were; then wormed with spun-yarn one-third the length; and then hove out, till the middle strand or heart is made to break in several places. The mouse, 2, (*Plate II. fig. 16*.) made with spun-yarn, &c. in the shape of a pear, is then raised on the stay, at one-third of its length, or by some at two sides of the mast-head, added to twice the length of the trestle-trees from the eye to the mouse. The warp of the mouse to be marline, and the pointing continued the circumference of the stay for the length of the tail. The collar, 3, the eye, 1, and one fathom below the mouse, 2, to be parcelled with worn canvas, well tarred, and served over with spun-yarn. (*Plate II. fig. 16*.) The stay is hoisted over the mast-head, and supports the mast, by extending from its upper end towards the fore part of the ship, and counteracts the strain of the shrouds which lead aft; and thus is the mast kept in a firm position fore, aft, and sideways.

Preventer-stay is next hoisted over the mast-head, the same as the former.

Collars.—Fore-stay-collars are fitted to the circumference of the bowsprit, and spliced together at the ends; wormed, parcelled, and served the whole length; then doubled, and a heart seized in the bight. The splice is to lie on the back of the heart with *quarter-seizings*, a score being cut on each side of the heart, large enough to admit from nine to twelve turns of seizing; the seizing to be snaked on the back, to lie closely.

Main-stay-collar, 4, (*Plate II. fig. 16*.) is made by the rope-maker with an eye in one end: in the house it is wormed, parcelled, and served round the eye and the whole length.

The fore-stay, 7, (*Plate III. fig. 1*.) and main-stay, have a heart turned into the lower end with a throat-seizing, 5,

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(*Plate II. fig. 16.*) and two round- seizings, 6 and 7, above, and the end of the stay capped with canvas, whipped and tarred, 8; then set up with its laniard, 9, (*Plate II. fig. 16.*) which is alternately reeved through the heart in the stay and the heart in the fore-stay-collar on the bowsprit. The laniard is set up with a luff-tackle, or luff upon luff, and the four first turns are stopt, and so on, till the laniard is expended: the end is then well stopt.

The fore-preventer-stay, 8, (*Plate III. fig. 1.*) sets up as the fore-stay.

The main-stay, 9, (*Plate III. fig. 1.*) sets up as the fore-stay. Its collar reeves from the starboard side, through a hole in the upper part of the knee next the stem, (or large triangular eye-bolt drawn through the stem, in some merchant ships,) then passed through the eye, 10, in the other end, and is brought down to its standing-part, and securely seized and crossed in two or three places, 11, 12, 13, (*Plate II. fig. 16.*) and the end capped; the heart is then seized in the bight above the bowsprit-chock.

The main-preventer-stay, 10, (*Plate III. fig. 1.*) sets up as the fore-stay, to a heart seized in the bight of its collar, which lashes round the fore-mast; on the fore-side through the eyes in the ends, or through bolts in the knight-heads or stem.

The mizen-stay, 11, (*Plate III. fig. 1.*) sets up through a thimble seized in the collar, which is lashed round the main-mast, about twelve feet up from the deck. A thimble is turned into the end of the stay, after it is reeved through the collar, and is set up with a laniard through an eye-bolt in the deck, abaft the main-mast.

The shrouds have a dead-eye turned into the lower ends, as 3, (*Plate II. fig. 15.*) left-handed, (being cable-laid rope,) with a throat-seizing, 4, clapt on close to the dead-eye; and above that a round-seizing crossed, 5, and the end of the shroud whipt with spun-yarn, and capped with canvas, 6, well tarred. The laniards, 7, are then reeved through the dead-eyes thus: the end of the laniard is thrust through the after-hole of the dead-eye in the shroud, and stopt with a walnut-knot; the other end is passed through the after-hole of its respective dead-eye in the chains, 8, then returns upwards, and reeves alternately through the holes in each, and is set taught with a tackle. It is customary to set up the shrouds the first time with temporary laniards of worn rope and spun-yarn seizings; and the proper laniards and seizings, when set up the last time for sea.

The tops, 12, 13, 14, (*Plate III. fig. 1.*) are gotten over their respective mast-heads by the girtlines.

The futtock-flaves are wormed, parcelled, and served with spun-yarn the whole length, in the house; and then cut to their lengths, as wanted, on board; and are seized along the lower shrouds horizontally, as much below the upper side of the tressle-trees as the cap is above. The shrouds are then *swiftered* together, thus: a spar is lashed to the outside of the shrouds, about a fathom below the futtock-flave; a single block is then lashed round each shroud and spar, except the foremost and aftermost shroud, so that all come in together; the swiftering-line is then reeved through each block from side to side, beginning in the middle, one end leading aft, the other forward; it then crosses, and reeves through two leading blocks, one on each side the deck, and is bowled tight, till the shrouds come in to the length of the catharpin-legs.

Catharpin-legs are four in number. The foremost is the shortest, and they increase an inch in length as they go aft. The length of the foremost one is from four feet in small, to eight feet in large ships. They have an eye spliced in each end, and then wormed, parcelled, and served with spun-

yarn the whole length, in the house. They are seized through the eye at each end, round the futtock-flave and shroud.

Ratlings, 23, 24, 25, (*Plate III. fig. 1.*) are fastened horizontally to the shrouds the first thirteen inches below the futtock-flave, and all the others the same distance asunder; they are fastened round each shroud with a clove-hitch, except at the ends, which have an eye, and seized round the shroud. The foremost and aftermost shrouds are left out for the first six ratlings down from the futtock-flave, and likewise the six lower ratlings next the dead-eyes. Small spars, or boats' oars, are seized to the shrouds, about five feet asunder, for the men to stand on to rattle down the shrouds. The swifterers on the shrouds are next removed half way down between the dead-eyes, and bowled tight, and so remain as long as convenient.

The cap is next swayed up into the top by the girtlines.

Bowsprit.—*Horses*, 15, (*Plate III. fig. 1.*) The outer ends are spliced round a thimble in the upper eye-bolt, on each side the bowsprit-cap. The inner ends have a thimble seized in, and set up to an eye-bolt in the knight-heads on each side the stem with a laniard; the turns are *frapped* together, and the end hitched.

Gammoning, 16, 17 (*Plate III. fig. 1.*) The end of the rope is first whipt; then passed through the hole in the knee, (but where there is no knee, through a large triangular ring-bolt driven through the stem,) and over the bowsprit with a round turn, and clinched close against the cleats; the other end is passed through the fore part of the hole and over the bowsprit, crossing every turn, keeping each turn forward on the bowsprit and aft in the hole, from nine to eleven turns, and every turn is hove tight and *nippeded*. The outer end of the bowsprit is swayed down by a chain-boat, or the ship's long-boat, loaded with casks of water, to make it fit close on the bed. When all the turns are hove tight, they are frapped together in the middle by as many cross-turns as are passed over the bowsprit, which are also hove very tight: the end of the gammoning-rope is then whipt, and seized to one of the turns.

Bobstays are wormed, parcelled, and served with spun-yarn three-fourths of their length; and their collars are fitted to the circumference of the bowsprit, with an eye spliced in each end; they are then wormed, parcelled, and served from eye to eye; and have a heart seized in the bight, with a long and short leg, with seven under and six riding turns, well strained and crossed with two turns; the end whipt, and secured with a walnut-knot, in the house. The bobstay-collar is lashed upon the upper side of the bowsprit at two-thirds out, or within the fiddle for the spritsail-slings, with from eight to ten turns through the eyes, and hove tight by a *heaver*. Ships in the navy generally have two pairs of bobstays, 18, 19, (*Plate III. fig. 1.*), merchant-ships commonly but one pair; one end is passed through a hole in the front of the knee, or large triangular eye-bolt in the stem; the ends are then spliced together. A heart, or dead-eye, is seized in the bight, the splice to come on the heart; it is then set up with a laniard, passing through the heart in the stay, and its collar by a luff-tackle.

Shrouds, 20, (*Plate III. fig. 1.*) are cable-laid rope; they have an iron hook and thimble spliced in the inner ends, and are served over the splice. They hook to an eye-bolt on each side the bow; the fore-ends have a heart, or dead-eye, seized in, and they are set up the same as the bobstays.

The use of the bobstays and shrouds is to draw down, and keep steady, the bowsprit; to counteract the force of the stays of the fore-mast, which draw it upwards.

Topmasts.—The girtlines may now be taken down from the

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the lower mast-heads, and one of the top-blocks securely lashed round the mast-head below the cap. The end of a hawser is then led up from aft, outside the trestle-trees, and reeves through the top-block at the mast-head, then leads down inside the fore part of the trestle-trees, and reeves through the sheave-hole in the heel of the topmast, and is racked to the topmast in two or three places between the heel and the hounds; it is there well stopt with three-quarter lashing, and enough of the end left to make fast round the mast-head. The other end of the hawser is led to the capstan. When the topmast is hove high enough to enter the trestle-trees, the end of the hawser is made fast round the mast-head: the lower cap, 32, 33, 34. (*Plate III. fig. 1.*) is then lifted over the head of the topmast, and securely stopt with lashing a little below the hounds. The topmast is now hove high enough for the cap to enter over the lower mast-head, and then lowered, that the cap may be beaten down firmly on the mast-head with mallets; then the lashings may be cast off, and as the topmast is raised the rackings are cut loose.

Top-rope-pendants have a large thimble spliced in the lower end, and are marled over the splice in the house, and pointed when on board. The top-rope-pendant is then reeved through the top-block, which is hooked to an eye-bolt on one side the lower cap, next through the sheave-hole in the heel of the topmast, then led upwards, and made fast to an eye-bolt in the cap opposite to the top-block. Through the thimble, at the lower end of the pendant, is hooked the block of the top-tackle; its lower block is hooked to an eye-bolt in the deck, and the fall brought to the capstan. The girtline-blocks are now lashed to the topmast-head, and the topmast-cross-trees and cap are swayed up into the top, and the cross-trees, 35, 36, 37, (*Plate III. fig. 1.*) fixed on the mast-head.

Burton-pendants for the mizen-mast, 3, and topmasts, fore and main, 21, 22, (*Plate III. fig. 1.*), have a splice in the middle to the circumference of their respective mast-heads; thimbles spliced in their lower ends; and served with spun-yarn over the splices in the house. The burton-pendants are hoisted by the girtlines, and placed over the topmast-head, that the thimbles may hang on each side, to which are hooked the burton-tackles.

Shrouds are warped out on the floor, as the lower shrouds are, and fitted to the circumference of the topmast-head. In the foremast shroud, on each side, is seized a sister-block, 2, (*Plate II. fig. 14.*), below the futtock-stave, in the house. They are swayed up and placed over the topmast-head, 41, 42, 43, (*Plate III. fig. 1.*); the first pair to lead down on the starboard side forward, the next pair on the larboard side forward, and so on with the other two pair. The dead-eyes are turned in to their ends the same as the lower eyes are, and are set up with lanyards to the dead-eyes in the futtock-plates by the burton-tackles.

Futtock-shrouds, 26, 27, 28, (*Plate III. fig. 1.*) The whole-lengths are divided into four, and cut in the bights. Each length has a hook and thimble spliced in each end, and the ends of the splices stopt with spun-yarn; then doubled, and a spun-yarn tied in the middle for the cutting-mark. The hooks are then hooked in each other, and got upon the stretch. They must be well hove out, in order to try the hooks and splices, as the topmast, &c. depends very much thereon. If a hook should break, or a splice draw, the former must be shifted, and the latter hauled tighter through. After they are sufficiently stretched, the ends of the splices are tapered, marled down, and served with spun-yarn within two feet of the cutting-mark; then cut asunder, and the ends whipt. On board, their upper ends hook to a hole in the lower end of the futtock-plates, and the lower ends of the

futtock-shrouds are made fast to the lower shrouds, with a round turn round the futtock-stave and shrouds, and seized up on the standing-part of the shroud with two seizings crossed.

Stays are swayed up and placed over the topmast-head next the shrouds, in their order thus: the breast-backstay first, and the standing-backstay next; then the topmast-stay; and, lastly, the topmast-preventer-stay.

Topmast-caps, 38, 39, 40, (*Plate III. fig. 1.*) may now be lifted on the topmast-head, and beat down firm; the girtlines unlashd and taken down, and the topmast hove up and fidded. Then set up the shrouds, 41, 42, 43, (*Plate I. fig. 1.*), and rattle them down, as before directed. Set up the breast-backstay, &c. thus: the *breast-backstay*, 44, 45, (*Plate III. fig. 1.*) has a single block turned into the lower end, with a throat and round-seizing, through which reeve the runner, one end of which is made fast to the chain-plates, abreast the mast, with a half-hitch, and the end seized down. In the other end is spliced a double block, connected by its fall to a double block that is strapped with an eye, through which a span is reeved, that has an eye spliced in each end, by which it is lashed to the chain-plates.

Standing-backstays, 46, 47, 48, (*Plate III. fig. 1.*) are set up, the same as a shroud, to a small dead-eye in the after-end of the channel.

Shifting-backstays, 49, 50, 51, (*Plate III. fig. 1.*) are clinched round the topmast-head and a thimble spliced in the lower end, to which is hooked a tackle, the lower block of which is hooked to an eye-bolt over the side, and frequently shifted, so as to render the topmast under a prefs of sail of the greatest assistance.

Fore-topmast-stay, 52, and *fore-topmast-preventer-stay*, 53, (*Plate III. fig. 1.*) are set up by passing the end through a sheave under the *bees* of the bowspit; then a long tackle-block is turned into the ends, which is connected by its fall to a single block hooked to an eye-bolt in the bow on each side, and set up with a luff-tackle, cat's-pawed to its fall. When the stay is set up, the parts of the tackle are stopt together with a rope-yarn, and the fall of the long-tackle is pulled through the eye-bolt and arse of the block alternately till it is expended; the end is then made fast round all the parts with two half-hitches.

Main-topmast-stay, 54, (*Plate III. fig. 1.*) reeves through a single block, strapped with a long and short leg; the short leg has an eye spliced in it, the long leg goes round the foremast-head above the rigging, and through the eye of the short leg, and is turned back and seized. The stay, having a thimble turned in the lower end, leads down between the cat-harpins and the mast, and sets up with a lanyard to an eye-bolt in the deck, close abaft the mast.

The *preventer-stay*, 55, (*Plate III. fig. 1.*) reeves through a thimble seized in the bight of a collar, that is lashed close up to the *bibs* of the fore-mast, and then set up to an eye-bolt, as the topmast-stay.

Mizen-topmast-stay, 56, (*Plate III. fig. 1.*) reeves through a thimble seized in the bight of the collar, that is lashed close up to the *bibs* of the main-mast; a thimble is then spliced into the end of the stay, which is set up by its lanyard to a thimble in another collar, that is lashed round the mast, a little below the cat-harpins.

When the *stays* are set up very tight, the shrouds and backstays must be cast off, and the mast-head gotten so far forward as nearly to touch the fore part of the partners by the runners and tackles, 29, 30, (*Plate III. fig. 1.*) or burtons of the mizen-mast, 31, (*Plate III. fig. 1.*) The pendants are frapped together abaft their respective masts, and the runners made fast as far as convenient before the mast, and the falls led to the capstan or windlafs.

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Lower Yards.—The lower yards must first be gotten on board thus: the hawser that hove up the topmast is made fast round the yard with a round turn and two half-hitches, securely stopt with spun-yarn along the yard in several places, and well stopt at the upper arm. As the yard is hove on board, the stops are cut, and the runner-tackle of the opposite side is brought on to the quarter of the yard, to assist it in lowering as the yard advances on board beyond the slings. They are laid athwartships before their respective masts, but the fore-yard must be kept above the main-stay by the runners, which are made fast round each quarter of the yard. They are then rigged as follows.

Horfes, 1, 2, 3, (*Plate III. fig. 2.*) have an eye spliced in one end to the circumference of the yard-arm, and served with spun-yarn over the splice. The eye goes over the yard-arm, 1, and stops against the cleats, and the other end reeves through the thimble in the lower end of the stirrups, 2, which are from three to four in number; the inner end of the horfes then have a thimble turned in, with a throat and round seizing, through which they are lashed to the yard, just beyond the sling-cleats on the opposite side. The stirrups, 3, (*Plate II. fig. 17.*) have their upper ends opened and plaited, and are fastened to the yard at equal distances with three round turns, and nailed, so as that the horfes may hang suspended about three feet below the yard.

Yard-tackle-pendants, 4, 5, 6, 7, (*Plate III. fig. 2.*) have an eye spliced in one end the size of the yard-arm, 4, and a double block in the other end, 5, and the splices served over with spun-yarn in the house. The eye is put over the yard-arm next the horfes, and the double block is connected by its fall to a single block strapped with a hook and thimble, 6, *Plate II. fig. 17.*

Brace-pendants, 8, 9, 10, 11, 12, 13, (*Plate III. fig. 2.*) have an eye spliced in one end, as in the former, and a single block in the lower end, and the splices served over with spun-yarn in the house. They, like the former, are next put over the yard-arm, 7, and the brace reeved through the single block, 8, (*Plate II. fig. 17.*) Sometimes in the navy, but mostly in merchant-ships, the block is lashed close up to the yard, without a pendant. *Fore-braces* have their standing-part made fast round the collar of the main-stay, on each side, with a hitch, and the end seized. The leading-part reeves through a single block, lashed on each side the main-stay-collar, close up to the rigging, and leads down and passes through a sheave in the brace-bitts, at the fore part of the quarter-deck. The *main-braces* have their standing part made fast with a clinch round an eye-bolt in the upper part of the quarter-piece: the leading-part reeves through a fixed block close aft upon the plank-sheer, or a block lashed to an iron stay projecting on the side, and leads in and belays round a cleat on the inside. The standing and leading-parts of the main-brace are led aft through a thimble spliced in the end of a *span* with two legs, which is made fast with a half-hitch round the mizen-shrouds on each side.

Preventer-braces to the fore-yard, in war, reeve through a block lashed round the yard-arm, 9, (*Plate II. fig. 17.*) and through a block in a span, hitched round the bowsprit-cap; they lead in upon the forecastle, and the standing-part makes fast round the cap. Those to the main-yard reeve through the block on the yard-arm, then through a block lashed to the fore-shrouds, close below the cat-harpins, lead down upon the forecastle, and the standing-part makes fast to the shrouds above the block with a hitch, and the end is seized.

Top-sail-sheet-blocks are next put over the yard-arms, 8, 9, 10, 11, (*Plate III. fig. 2.*), strapped with an eye to the size of the yard-arm, 10, *Plate II. fig. 17.*

Lift-blocks are then spliced into the straps of the top-sail-sheet-blocks, 11, (*Plate II. fig. 17.*); the lifts, 12, 13, 14,

15, 16, 17, (*Plate III. fig. 2.*) reeve through a block in a span, hitched round the mast-head, between that and the top-mast, then lead down abreast the shrouds, and reeve through a block fastened to the side, and there belay.

Quarter-blocks, 18, 19, (*Plate III. fig. 2.*) are strapped with a long and short leg, with a lashing-eye spliced in each end, through which they lash round the middle of the yard, within the cleats, the block hanging downwards, 11, *Plate II. fig. 17.*

The quarter-block is a double block, with a thick and thin sheave running on the same pin, through which reeve the top-sail-sheets, and the thin sheave is intended for the clue-lines; but a single block, in lieu of them, is recommended, as they would lead fairer and work easier. Large merchant-ships have a single block lashed on each side of the middle of the yard, and the sheets reeve on their respective sides, and lead down by the sides of the mast. Smaller ships have a double block lashed in the middle of the yard, as the quarter-block, through which the sheets reeve, and lead down on opposite sides.

Clue-garnet-blocks, 12, (*Plate II. fig. 17.*) lash through the eyes upon the yard, the blocks to hang downwards, four feet without the sling-cleats, on each side.

Leech-line-blocks, 13, (*Plate II. fig. 17.*) are lashed through the eye and round the yard, ten feet within the cleats at each yard-arm. The blocks to hang on the fore-side of the yard.

Bunt-line-blocks, 14, (*Plate II. fig. 17.*) are lashed, like the former, midway between them and the slings.

Slab-line-blocks, 15, (*Plate II. fig. 17.*) are strapped with a short lashing-eye, and are seized to the span of the quarter-blocks underneath the yard.

Tricing-blocks, 16, (*Plate II. fig. 17.*) for the yard tackles are strapped as the above, and are seized round the yard about one-third the length within the arm-cleats. The blocks to hang under the yard.

The *inner tricing-line*, 20, (*Plate III. fig. 2.*) reeves through a block lashed to the futtock-stave, has a long-eye spliced in the outer end, the bight is put over the hook of the single block with a couple of turns, 17, (*Plate II. fig. 17.*), and the leading-part belays to the shrouds. At sea it is hooked to a becket, or strap, round the futtock-staff. The *outer tricing-line*, 21, (*Plate III. fig. 2.*) is spliced round the strap of the yard-tackle-block, 18, (*Plate II. fig. 17.*), and reeved through a block on the yard, it then reeves through a block lashed in the shrouds near the futtock-staff, and leads down upon deck.

Jeers, in large ships, are two large tackles, 22, 23, (*Plate III. fig. 2.*) The blocks at the mast head are hove up close on each side by the top-burton tackles, and so lashed, that every turn of the lashing is alternately passed through the strap of the block (*Plate II. fig. 11.*), and over a broad elm-cleat, nailed on the opposite side of the mast-head, and the ends of the lashing are well stopt. The other two blocks are strapped with a double strap to the size of the yard, with a long and short leg (*Plate II. fig. 10.*) (See *Strapping of Blocks*, below.) They lash on each side the middle, or slings, within the cleats, 19, 20, (*Plate II. fig. 17.*) The long leg of the strap is passed down the aftside of the yard, and meets the bight of the short leg on the fore-side, and lashes, every turn passing alternately through each bight, rose-fashion. The falls reeve through the blocks at the mast-head and on the yard, and lead down upon deck. Jeers, in merchant-ships, and small ships in the navy, have two single blocks lashed on each side the mast-head, as above, and another, the same size, in the middle of the yard. The *eye* then reeves through one of the blocks at the mast head, then through the block on the yard, and then through the block on

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on the opposite side of the mast-head. In the lower ends of the eye is spliced a double block, with its fall, which reeves through another double block, that hooks to an eye-bolt in the deck. The fall of the jeers leads through the bits to the capstan, by which the yards are hoisted up in their place.

Trufs-pendants are doubled, and cut in the bight; they have a thimble spliced into one end, and are served with spun-yarn one-third the length, in the house. The ends that have the thimbles are passed round the yards within the slings-cleats, and are well seized. One end passes over the yard, the other under, and both ends round the mast. The star-board end reeves through the larboard thimble, and the larboard end through the starboard thimble. The lower end has a double block turned in, with a throat and round-seizing, and its fall reeves through a double block that hooks to an eye-bolt in the deck, on each side the mast, by which the trufs-pendant is straightened or slackened, consequently the yard is close confined, or removed from the mast.

The *nave-line* reeves through a single block lashed under the aftside of the top, and through a block or thimble seized to the trufs-pendants; one end leads upwards, and makes fast round the trestle-trees. The leading-part goes down upon deck.

Slings and Straps.—The strap has an eye spliced in each end, with a long and short leg, to the circumference of the yard, and served with spun-yarn from eye to eye, with a thimble seized in the bight. The slings have an eye spliced in one end, then wormed, parcelled, and served almost the whole length, in the house.

The long leg of the strap passes down the aftside of the yard, exactly in the middle, comes up the fore-side, meets the short leg, and lashes through the eyes, the thimble to be upwards. The slings have a large thimble seized to the bight with a long and short leg. The long leg passes round the after-part of the mast, and reeves through the eye in the short leg; it is then returned back, and securely seized to its own part in several places. By these the yards are slung at the mast-head by a laniard, that splices in the thimble in the slings at the fore-part of the mast, and then reeves through the thimble in the strap upon the yard, and alternately till the laniard is expended; the end then fraps round the turns, and makes fast with two half-hitches. In time of action, the yards are slung with chains.

Strapping of Blocks in the House.

A TABLE of the Dimensions of Straps for Lashing and Seizing Blocks.

Size of the Blocks.	Size of the Straps.	Length of the Straps.	
		Fet.	Inches.
17	5	7	6
16	4½	6	9
15	4	6	0
14	3½	5	6
13	3½	5	0
12	3½	4	6
11	3	4	3
10	3	3	9
9	2½	3	6
8	2½	3	0
7	2½	2	9
6	2	2	6
5	1½	1	9
4	1½	1	6

The whole length of all the different sizes of block-strapping is gotten upon the stretch, and hove out tight for worming and serving; after that is performed, it is cut into lengths agreeable to the above table, according to the size of the blocks. The scores of all blocks, if required, are to be opened, or eased, so as to receive the strap, and then to be well tarred, and the pin and sheave examined, before the strap is put on (*Plate II. fig. 1.*) The block is then set well into the straps with wedges, thus: the strapping is frapped together with rope-yarn under the block, with a chock between, and the wedges are set between the breast of the block and the chock. The strap is next nippered, with a heaver, round the block; the wedge, chock, and frappings are then removed, and the block hung up, that the strap may be well seized together, close under the block, with nine under and eight riding turns; every turn strained tight round with a heaver, and crossed each way with two turns.

Jeer-blocks (*Plate II. figs. 10, 11.*) are double scored, consequently strapped with a double strap, thus: it is spliced together at the ends, and when doubled, should be the size of the block and the circumference of the yard. It is then doubled, and the block seized in the bight, with a long and short leg, the splice lying in the arse of the block. Jeer-blocks for the mast-heads are strapped with long-eyes, to receive many turns of the lashing.

Blocks strapped with a thimble, or hook and thimble, (*Plate II. fig. 3.*) have the ends of the straps spliced together. The block is fixed in one bight, for the splice to lay, as above, and the thimble in the other bight; the seizing is clapt on, between the block and the thimble, with eight under and six riding turns, according to the size of the block; each turn strained by a heaver, turns double-crossed, and the end stopt with a wall-knot crowned.

Blocks strapped with eyes (*Plate II. figs. 4, 5, 6.*), or thimbles spliced in the ends, are seized tight into the bight, and the legs left long enough to lash through the eyes, round their respective mast, yard, &c. as the top-fail, clue-lines, clue-garrets, &c.

Blocks strapped with double tails are seized in the bight as the former; but those with a single tail are spliced in, and served with spun-yarn over the splice.

The strapping of jeer-blocks is wormed, parcelled, and served. Strapping of four inches diameter, and above, is wormed and served; and all under four inches is only served with spun-yarn; except the spritsail-brace, buntline, and leech-line blocks, that are lashed under the tops, which are only served with spun-yarn over the splice, and the tail left half a fathom in length.

Rigging the Top-fail Yards.

The top-fail-yards are first hove on board by the top-rope, which is fastened to the slings of the yard, and stopt from thence with spun-yarn to the yard-arm, and placed athwart their respective masts.

Horses, 1, rig the same as the lower yards, with the addition of *Flemish horses*, 2, (*Plate II. fig. 18.*) which have an eye spliced in each end; one eye is put over the eye-bolt in the yard-arm, and the other is seized round the yard within the arm-cleats, 24, 25, 26, *Plate III. fig. 2.*

Brace-pendants, 3, (*Plate II. fig. 18.*) are next put over the yards, as on the lower ones. The fore-top-fail-braces reeve through the block in the pendant, and then through a block lashed on each side to the main-ity-collars, a little below the fore-braces; the standing-part makes fast to the itay with a hitch, and is seized below the block. The leading-part leads from the block on the collar, through a block lashed on the itay,

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stay, over the fore hatchway, and through a block strapped with a thimble into an eye-bolt in the aft-part of the fore-castle, and belays to a pin in the skid-beams, 27, 28, *Pl. III. fig. 2.*

The main-topfail-braces reeve through the block in the pendant, and the standing-part makes fast to the mizen-stay collar. The leading-part reeves through a block in the span round the mizen-mast-head below the hounds, and through a sheave-hole in the mizen-topfail-sheet-bitts, abaft the mizen-mast, and belays there; 29, 30, *Plate III. fig. 2.*

The mizen-topfail-braces reeve through the block in the pendant. The standing-part makes fast round the peek-end, and the leading-part reeves through single blocks at the peek, and comes down and belays to the fore-side of the taffarel to a cleat; 31, 32, *Plate III. fig. 2.*

Reef-tackle-pendants, 4, (*Plate II. fig. 18.*) reeve through the upper sheave in the *sifter-block* in the topmast-shrouds, thence through a sheave-hole in the yard-arm, and are flopt with an over-hand knot, till the fail is bent. A double block is turned in to the lower ends of the pendants, and its fall reeves through another double block, that is seized to the after-part of the lower treitle-trees, and the falls lead down upon deck; 33, 34, 35, 36, *Plate III. fig. 2.*

Lift-blocks, 5, (*Plate II. fig. 18.*) are strapped with an eye to the size of the yard-arm. The lift reeves through the lower sheave in the *sifter-block* in the topmast-shrouds, and through the block on the yard-arm. The standing-part hooks to a becket round the top-mast-cap, and the leading-part leads down the side of the mast, and belays to the dead-eyes in the lower shrouds; 37, 38, 39, 40, 41, 42, *Plate III. fig. 2.*

Tye-blocks, those at the topmast-heads, lash close up to the rigging, under the collar of the stay; and the blocks on the yard, 6, (*Plate II. fig. 18.*) lash under the fore-part of the yard, as the lower ones. The standing-part of the double-tyes in large ships clinch round the mast-head, then reeve through the double block upon the yard, return upwards, and reeve through the block on each side the mast-head; 43, 44, 45, (*Plate III. fig. 2.*) The fly-blocks are then spliced in their lower ends, and connected by their haliards to a single block, that is strapped with a long strap, with a hook and thimble, that hooks to a swivel-eye-bolt in the channel on each side: the leading-part comes in-board through a block lashed on each side; the foremost ones abaft the fore-castle, and the after-ones on the quarter-deck. A single tye rigs like the lower yards in small ships.

Buntline-blocks are spliced round the straps of the top-fail-tye-block upon the yard, 7, *Plate II. fig. 18.*

Clue-line-blocks are strapped with two lashing-eyes, and lash upon the yard, three feet without the slings, the blocks hanging under the yard, through which the clue-lines reeve and lead down upon the deck, 8, *Plate II. fig. 18.*

Top-gallant-sheet-blocks, 9, (*Plate II. fig. 18.*) are strapped with two lashing-eyes, and lash upon the yard, close within the clue-line blocks on each side.

Parral. (*Plate II. fig. 20.*) The parral-ropes in the house have an eye spliced in each end, are wormed and served with spun-yarn from eye to eye, then doubled, and cut asunder in the bight. The end of one rope is thrust through the upper hole in the ribs, and a truck, alternately. The end of the other rope is passed through the lower hole in the ribs and a truck the reverse way. The parral is fitted to the aft-side of the topmast, and the eye in one end passed under the yard, and the other over, till both eyes meet and are seized together on the fore-side with spun-yarn. The other ends of the parral-rope are passed round the yard and aftside of

the parral alternately, till the latter is well secured to the former; and the whole of the turns are marled together with quarter-seizings, to confine them close in the cavity on the aftside of the ribs. Thus the yard is confined to the mast, but easily hoisted or lowered when the mast is kept clean and greased.

Jib-boom to be rigged.—The jib-boom is hoisted on board and laid on the bowsprit, and its fore end pointed through its hole in the bowsprit-cap. The heel-rope or top-rope may be reeved through the sheave-hole at the heel, and one end made fast to the eye-bolt on one side of the bowsprit-cap, the other reeved through a single block made fast to an eye-bolt on the opposite side, and lead in upon the fore-castle, 46, *Plate III. fig. 2.*

The *traveller* is first put over the outer end of the jib-boom, and the hook kept inwards; 47, *Plate III. fig. 2.*

Horses are doubled, and served with spun-yarn one fathom in length in the bight, and knotted with an over-hand knot, at the distance of every yard, in the house. On board, the bight is taken over the outer end of the jib-boom, with a jamming-knot, close against the stop, which prevents them coming in. The inner ends are brought aft and made fast, with a round turn round the jib-boom, within the cap. The ends are flopt back with two or three seizings of spun-yarn, to prevent their being cast off by mistake; 57, *Plate III. fig. 1.*

Guy-pendants are put over the jib-boom, the same as the horses, and the inner ends reeve through a thimble, on the quarters of the spritsail-yard, and turn in to the strap of a double block, with a throat and round-seizing, and its fall reeves to a single block, that hooks to an eye-bolt near the cat-head, and leads in upon the fore-castle; 49, 50, *Plate III. fig. 2.*

A *strap* is put over the end of the jib-boom, with three thimbles seized in it; the middle thimble is the largest, and reeves the fore-top-gallant-stay, and the smaller thimbles on each side the fore-top-gallant-bowlines.

The *spritsail-yard* is hove on board, and laid fore and aft the fore-castle for rigging with its *horses*, 51, 52, (*Plate III. fig. 2.*) The eye in the outer end is put over the yard-arm on each side, and flops against the cleats. The eye in the other end is well seized to the yard, at three feet beyond the slings, with *stirrups* and *Flemish horses*, the same as the top-fail-yards, 53, *Plate III. fig. 2.*

Braces and Pendants.—The eye in one end of each pendant goes over the yard-arm close against the horses, and the brace reeves through a single block spliced in the other end; the standing-part makes fast to the stay-collar, and the leading-part reeves through a double block, made fast under the fore-top, and then leads through another, made fast to the aft-part of the top, and down to the aft-part of the fore-castle; 54, 55, *Plate III. fig. 2.*

Lifts.—The blocks are strapped with an eye to the size of the yard-arm, and driven thereon close to the braces. The lift reeves through a single block in the end of a *span*, which is passed with a hitch round the cap under the jib-boom, and through the block on the yard-arm, and the standing-part returns upwards, and is made fast to an eye-bolt in the side of the cap; the leading-part comes in upon the fore-castle. They are occasionally used for spritsail-top-fail-fleets.

The *standing-lift* has an eye spliced in one end, and lashes to the yard one-fourth from the slings: the other end has a thimble spliced in, and is set up with a lanard to a thimble spliced in a strap that is hitched round the bowsprit within the *bees*; 56, 57, *Plate III. fig. 2.*

Clue-line-blocks are strapped with two eyes, and are lashed

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lashed through those eyes round the yard three feet without the slings, the lashing to be upon the yard.

The *strap* has a thimble seized in the bight, and is spliced or seized round the yard in the middle, between the cleats. Also on each quarter of the yard is seized a strap, with a thimble, through which are led the jib-guys. The yard may now be hove out towards its place, and the long-tackle block of the haliards hooked into an eye-bolt in the after-part of the bottom of the bowsprit-cap; the hook to be moused with spun-yarn, to prevent its slipping loose. The single block is hooked to the thimble in the strap at the slings, and the fall then leading in upon the forecastle, the yard is hove to its place.

The *slings* have an eye spliced in each end, one of which goes round the yard close within the cleats near the middle, and seizes with a quarter-seizing close to the yard; the other end goes over the bowsprit before the saddle, and under the yard, then over the bowsprit again, till the eyes in the ends, meeting close together, are well lashed.

Preventer-slings are used when the haliards are taken in. The outer end has a hook and thimble spliced in and served down over the splice, that hooks to the eye-bolt in the bottom of the cap. The inner end reeves through the thimble in the strap at the slings, and is hitched with two half-hitches, or spliced.

The *sprit-sail-top-sail-yard* is hove on board, &c. as the former, and the

Horses, having an eye in their outer ends, are put over the yard-arm on each side, and stop against the cleats; the inner end has an eye, which is seized to the yard, three feet without the slings, 58, *Plate III. fig. 2.*

The *braces* have an eye spliced in one end, that goes over the yard-arm on each side; the inner ends lead through a block made fast to the under side of the fore-top, from thence through another at the aftside under the top, and lead down to the aft-part of the forecastle, and there belay; 59, *Plate III. fig. 2.*

The *lifts* have an eye spliced in their outer ends, and are driven over the yard-arm close to the braces; the inner end reeves through a thimble, seized on each side a strap hitched over the end of the jib-boom, and leads in upon the forecastle through a saddle on the bowsprit, and belays to a rack over the bowsprit, 60, *Plate III. fig. 2.*

The *clue-line-blocks* are strapped with two eyes, and are lashed through those eyes round the yard, about two feet without the slings.

Haliard.—The standing-part is made fast with a bend through the becket of its block, lashed under the outer end of the jib-boom; then reeves through a single block, lashed round the middle of the yard between the cleats; then forward, and reeves through the block at the outer end of the jib-boom, and leads in upon the forecastle, and belays to a rack over the bowsprit, 61, *Plate III. fig. 2.*

Top-gallant Masts.—The *top-rope* reeves for the top-gallant-mast as it does for the topmast, observing to stop it to the top-gallant mast-head with spun-yarn, to keep it steady till it has entered the topmast-cap; the stop is then cut, and the end of the top-rope made fast to the eye-bolt in the topmast-cap.

A grommet of rope, spliced to the size of the mast, is first put over the head, and beat down close to the stop of the hounds.

Shrouds, backstays, and stays, are fitted in the house, and hoisted over the top-gallant-mast-head, the same as the topmasts, and the top-gallant-mast is then swayed up and fidded.

The *shrouds* are then thrust through a hole in the end of

the topmast cross-trees, and between the topmast shrouds, over the futtock-staff. A thimble is seized in the ends that set up with the laniard through a thimble seized in the bight of a strap, made fast round the futtock-plates, close under the dead-eyes, with a turn through the bight, 58, 59, 60, *Plate III. fig. 1.*

Backstays set up, the same as the topmast-backstays, to a small dead-eye in the aft-part of the channel, or in a stool abaft the channel, 61, 62, 63, *Plate III. fig. 1.*

Fore-top-gallant-stay, 64, (*Plate III. fig. 1.*) reeves through a single block in large ships, or a thimble in the strap at the outer end of the jib-boom of frigates and smaller vessels. The former sets up by its tackle to an eye-bolt in the head; the latter with a jigger-tackle occasionally, and is secured by a laniard to the gammoning or eye-bolt in the head.

Main-top-gallant-stay, 65, (*Plate III. fig. 1.*) is cable-laid in large ships, and fitted with a collar and moused, as the lower stays. Smaller ships are hawser-laid, have an eye spliced in the upper end to the circumference of the mast-head, and served with spun-yarn over the splice in the house. It reeves through a single block at the fore-topmast-head, has a thimble turned into the end of the stay, and sets up to a thimble in a span, made fast to the trestle-trees of the foremast by its laniard.

Stay-sail-stay, 1, (*Plate IV. fig. 1.*) is spliced into the top-gallant-stay, one fathom below the top of the mast, it then reeves through a block or thimble lashed to the fore-topmast-head, takes a turn round the trestle-trees, and belays there.

Mizen-top-gallant-stay, 66, (*Plate III. fig. 1.*) sets up to the main-topmast-head, as the main-top-gallant-stay sets up to the fore-topmast-head.

Flag-staff-stays go round their respective top-gallant or royal mast-heads with a running-eye, and are kept close up under the truck, by a small cleat nailed on each side. The fore one reeves through a thimble at the jib-boom end, and belays round the fore-stay-collar. The main one reeves through a thimble above the fore-top-gallant rigging, and belays in the top. The mizen one the same above the main-top-gallant rigging.

Royal masts are rigged as top-gallant-masts, and often abaft the mast.

The *top-gallant-yards* are hove on board, and rig with horses, braces, and lifts, over the yard-arm, the same as the top-sail-yards.

Braces, 1, (*Plate II. fig. 19.*) The fore-top-gallant-braces, 56, (*Plate III. fig. 2.*) reeve through the block in the pendant of large ships, or the block in the yard-arm of small. The standing-part makes fast with a hitch, and the end seized back round the collar of the main-topmast-stay on each side; and the leading-part reeves through a block lashed round the collar a little below the standing-part; then leads through a block at the aft-part of the fore-top, and belays to a pin at the aftside of the forecastle.

The *main-top-gallant-braces*, 57, (*Plate III. fig. 2.*) reeve as the former. The standing-part makes fast with a hitch, and the end seized back round the collar of the mizen-topmast-stay, and the leading-part through a block seized just below the standing-part, and leads down into the mizen-shrouds.

The *mizen-top-gallant-braces*, 58, (*Plate III. fig. 2.*) are single, and go with a splice over the yard-arm. They lead through a thimble at the mizen-peek, come down, and belay to a cleat on the fore-side of the taffrail.

The *lifts*, 59, 60, 61, (*Plate III. fig. 2.*) are single, and go over the yard-arm with an eye; the other end reeves through

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through a thimble in the top-gallant shrouds, leads down into the top, and belays round the dead-eyes.

Clue-line-blocks, 2, (Plate II. fig. 19.) are strapped with two lashing-eyes, and lash upon the yard three feet without the slings. The clue-line reeves through the block which hangs under the yard, which is stopt with a knot till the fail is bent. The leading-part comes down the mast, and belays to the shroud-rack.

The *tye*, 3, (Plate II. fig. 19.) reeves through the sheave-hole in the top-gallant-mast hounds, and clinches round the yard at the slings; in the lower end is turned a double or single block, according to the size of the ship, through which reeves the haliard, and through a single block lashed to the after-part of the lower trestle-trees, under the top, and belays round the cross-piece of the bitts abaft the mast.

Parrel, the same as the topfail-yard, after the yard is swayed up.

Rigging of Royal-Yards.

When they have royal masts, they rig as the top-gallant-yards above; but if there are no royal masts, they set flying; that is, the *haliard* reeves through a sheave-hole close up under the truck; the standing-part clinches to the middle of the yard, and the leading-part comes down and belays in the top.

Rigging of the Mizzen-Yards.

Mizzen-yards are now seldom used, and that only in line of battle ships in the navy, and large East India ships.

They are hove on board as the lower yards, and the *Derrick-block* is strapped with two eyes, that go round the yard and lash underneath, between the slings and outer yard-arm or peek. The *Derrick-fall* reeves through the double block that is cross-seized in the strap, has an eye spliced in each end, and lashes to the mizen-cap; then through the single block upon the yard. The standing-part is again taken up and reeved through the block at the mizen-cap; an eye is then spliced in the end to the size of the yard-arm, that jams over the peek-end. The leading-part comes from the double block at the cap, leads down through the trestle-trees to a block in the larboard, mizen channel, and through the side upon deck.

Brail-blocks are strapped together in one strap, and lie over the yard, and seized together underneath; the throat-blocks next the cleats near the mast; the middle-blocks in the middle between the throat-blocks and the peeks; the peek-blocks about three or four feet within the cleats at the peek.

Vangs.—The pendants are doubled, and served with spun-yarn two fathoms long in the bight, and a double block spliced in each end, and served with spun-yarn over the splice in the house. The bight is put over the peek-end with a hitch. The falls reeve through the double block in their ends, and a single block is hooked to an eye-bolt in the quarter-piece on each side. The standing-part makes fast to the becket of the single block, and the leading-part from the double block, belays to a cleat on the taffrail.

Signal haliard-block is lashed to an eye-bolt in the peek of the yard.

Jeers.—The fall reeves through a treble or double block lashed at the mast-head, and likewise a double or single block lashed between the sling-cleats, and the leading-part comes into the mizen-chains on the starboard side as the derrick did on the larboard side. The yard is then swayed up, and the fall made fast with a hitch, and seized.

Slings go round the mast-head, and round the yard between the sling-cleats, which are kept abaft the mast.

Bowlines reeve through a single block strapped with a thimble into an eye bolt, in the lower end of the yard, and through a block hooked to an eye-bolt in the side abreast the lower end of the yard, or lashed to the mizen-shrouds.

Horse for the mizen-sheets clinches to an eye-bolt on each side the fore part of the taffrail with a thimble, to which is strapped the sheet-block.

Gaff.—If the mizen-yard is not used, there must be a *gaff*, 20, (Plate IV. fig. 1.) as in smaller vessels, which is rigged similarly to the mizen-yard, excepting only that it has a throat-haliard instead of jeers, which hooks to an eye-bolt over the jaws: and a span instead of a derrick, 21, Plate IV. fig. 1.

The *driver* or *spanker-boom* rigs with a *tepping-lift*, 25, (Plate IV. fig. 1.) which goes over the outer end of the boom with a clove-hitch, and stops against the shoulder; the ends are reeved through a single block lashed on each side of the mizen-mast-head; then have a double block spliced in each lower end, which reeves with its fall to a single block, hooked to an eye-bolt in each mizen-channel. The standing-part makes fast to the becket of the single block, and the leading-part belays to a cleat on each side of the mizen-mast.

Guy-pendants, 26, (Plate IV. fig. 1.) have a hook and thimble spliced in one end, that hook to a thimble on each side of a strap spliced round the boom, over the horse at the fore-side of the taffrail; a thimble is spliced in the inner ends of the pendants, to which is hooked the tackle on each side, that are used where most support can be given to the boom.

Rigging and Bending the Sails.

Rigging and bending the fore-course, 5, (Plate IV. fig. 2.) This fail is hoisted on board by the yard-tackles, and laid athwart the main-stay, ready for bending, thus; the *sheet-block* is strapped with an eye, and put over the clue on each side. The tack is next thrust through the clue for the knot to come on the aftside.

Clue-garnet Block.—The eyes of the strap are put through the clue, brought up on each side, and seized on the top.

Tacks are cable-laid, and tapered in the making. The biggest end is opened out long enough to heave the knot close together; the knot is double-walled and crowned; the ends are thrust through the walling, then scraped down, served over with spun-yarn, and are wormed, parcelled, and served with spun-yarn one-fourth of the whole length, in the house. (Plate I. fig. 14.) *Single tacks*, as the above, reeve through the block lashed round the outer end of the boomkin, on each side; then lead in upon the fore-castle or upper deck, and belay round a large cleat upon the cat-tail, or the bitts near the mast. In *double tacks*, the standing-part makes fast round the outer end of the boomkin, and the leading-part reeves through a single block lashed to the clue of the fail, then through the block at the outer end of the boomkin, and leads in as the above, 21, Plate IV. fig. 2.

Sheets, 23, (Plate IV. fig. 2.) are reeved through the sheet-block at the clues, and the standing-part seizes or splices with a thimble to an eye-bolt in the side a little before the gangway. The leading-part reeves through a sheave in the side above the eye-bolt, leads forwards, and belays round a large cleat in the side.

Yard-ropes are temporary, and are only used to get up the fail; they reeve through tail-blocks, that are made fast round the boom-iron at each yard-arm, and one end comes down

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down and makes fast to the upper reef-earring cringle. The leading-part comes in upon deck, through a leading-block lashed to a timber-head or eye-bolt. The fail is then run up to the yard, where the men go and pass the

Earrings: one end of the earring splices to the head-cringle with a long-eye; the other end passes over the yard-arm, without the rigging, and through the cringle alternately, two or three times, and likewise passes round the yard, within the rigging, and through the cringle, till the earring is expended, making fast the end with two half-litches. The outer turns are to stretch the head of the fail tight along the yard, and the inner turns to draw it close up.

Reef-sarings, when used, the same.

Rope-bands, which fasten the head of the fail along the yard, are braided cordage, with an eye in one end, and one leg longer than the other. The eye of the long leg is put over the short leg, and the eye of the short leg is thrust through the eye-let hole at the aftside of the fail, and passes through the eye of the short leg; and so of the rest. The rope-bands, being previously reeved through the head of the fail, fasten to the yard as follows. The long leg comes over the yard from the foreside, with a round turn between the head of the fail; the short leg comes up the aftside, and makes fast with a reef-knot upon the yard. The fail is then let fall to see it is clearly bent.

Points are usually put in the fail at the fail-loft. See *SAIL-Making*.

Gaskets are braided cordage, which go round the yard with a running-eye, two on each quarter, and one at each yard-arm: the bunt-gasket in the middle has two legs, and lashes to the yard on each side of the quarter-blocks. These are used when the fail is *furled*, to bind it firmly up to the yard, by passing the gasket six or seven times round the yard and fail, each turn a certain distance apart, or spirally, making fast the end with two half-litches.

Clue-garnets, 24, (*Plate IV. fig. 2.*) reeve through their block upon the yard on each side, then through the block at the clue of the fail. The standing-part is carried up, and made fast round the yard by its block with a timber-hitch, and the end stopped. The leading-part comes down upon deck, and reeves through its sheave-hole in the topfail-sheet-bitts, and there belays.

Bowlines, 25, (*Plate IV. fig. 2.*) reeve through a single block lashed round the collar of the fore-stay, or the fore-preventer-stay on the bowsprit, and the outer part reeves on the bowline-bridle, with a thimble spliced in the end, and the bridle clinches to the cringle on the leech of the fail. The leading-part comes in upon the fore-castle, and belays to the fore-topfail-sheet-bitts.

Leech-lines, 26, (*Plate IV. fig. 2.*) reeve through the spritsail-brace-block, under the top, then through the block upon the yard, and the standing-part makes fast with a clinch to the upper bowline-bridle; the leading-part then reeves through a double block, at the aft-part of the top, and comes down upon the fore-castle.

Bunt-lines, 27, (*Plate IV. fig. 2.*) reeve through the leg and fall-block, and through a double block at the aft-part of the top, and through the blocks upon the yard, and lead down the fore-side of the fail, and clinch to the cringles in the foot. The fall reeves through the leg block; the standing-part makes fast to an eye-bolt near the mast, and the leading-part through a live-block under the cross-piece of the breast-bitts.

Slab-lines, 28, (*Plate IV. fig. 2.*) reeve through a small block lashed to the strap of the quarter-block, and the standing-part clinches with two legs to the middle bunt-

line cringles. The leading-part leads to the topfail-sheet-bitts, and belays to the cross-piece.

Spilling-lines, 29, (*Plate IV. fig. 2.*) reeve through blocks lashed on each side of the quarter-blocks of the lower yards, then lead down before the fail, return upwards under the foot of the fail, and make fast round the yard with a timber-hitch.

Life-lines are sometimes used for the preservation of the seamen. They are generally of worn hawser-laid rope, and are made fast with the two half-litches round the strap of the lift-block, and jee or tye-block, in the middle of the yard.

Rigging and Bending the Main-Course, 1, *Plate IV. fig. 2.*

This fail is hoisted on board, and laid athwart, ready for bending, as the fore-course. Sheet-blocks, tacks, and clue-garnet-blocks, are fitted in the clues as the fore-course.

Tacks, single, 31, (*Plate IV. fig. 2.*) reeve through the sheave-hole in the chesttree, on each side, and lead on board through a sheave-hole in the side, and belay round a range-cleat in the waist.

Tacks, double, 32, (*Plate IV. fig. 2.*) The standing-part clinches to an eye-bolt before the chesttree, and the leading-part reeves through a single block lashed to the clue of the fail; then leads in upon deck, through the chesttree and sheave-hole in the side, and belays as the above.

Sheets, 33, (*Plate IV. fig. 2.*) reeve through the sheet-block at the clues. The standing-part is seized to an eye-bolt with a thimble on the quarters; the leading-part comes on board through a sheave-hole in the side, and belays to a range-cleat in the waist. The present custom is for the leading-part of the sheets to reeve through a block lashed to the eye of an iron stay, projecting from the side, called a *spider*, and comes in upon deck through a port that has a roller fitted vertically at its aftside.

Yard-ropes and bending, as the fore-course.

Earrings, rope-bands, points, gaskets, and clue-garnets, as the fore-course.

Bow-lines, 34, (*Plate IV. fig. 2.*) reeve through a double block, lashed round the fore-mast five feet above the fore-castle, and the outer part reeves upon the long leg with a thimble. The lower bridle is the longest, and clinches to the lower cringle on the fail. In the other end is spliced a thimble, through which reeves the upper leg; that clinches to the upper cringle. The starboard bow-line belays on the larboard, and the larboard bow-line leads over and belays on the starboard side. Four feet from the bridle on each bow-line is spliced a thimble, and pointed over, called a *lizard*, to which is hooked a bow-line tackle that makes fast to the bitts, and is bowled upon until the bow-line can be made fast to the bitts.

Leech-lines, 35, (*Plate IV. fig. 2.*) reeve through the block upon the yard, and the outer end makes fast with a clinch to the upper bow-line bridle. The leading-part reeves through a double block at the fore part of the top, and another at the aft part of the top. A single block is turned into the lower end, and a whip-fall reeved through it. The standing-part makes fast to an eye-bolt in the deck; and the leading-part reeves through a block under the cross-piece of the bitts, near the mast.

Bunt-lines, 36, reeve as the fore-course, and lead forward upon the fore-castle.

Slab-lines, 37, *spilling-lines*, 38, and *life-lines*, 39, (*Plate IV. fig. 2.*) as the fore-course.

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Rigging and Bending the Mizzen-Course, 9, *Plate IV. fig. 2.*

Earing reeves, with an eye in one end, through the cringle in the peek of the fail, and makes fast round the peek as the earings above.

The *noek-earings* the same as the peek.

Lacing is spliced to the peek-earring-cringle, and laces round the yard or gaff, through the eye-let holes in the head of the fail, and makes fast to the noek-earring-cringle. *Lacing* round the mast is spliced to the noek-cringle, and round the fore-side of the mast, backwards and forwards, and through each cringle on the fore-leech of the fail, making fast to the tack at the lower end.

Tack sets up with a laniard reeved through the tack-cringle in the foot of the fail, and through an eye-bolt in the deck.

Sheet reeves through a block on the horse, at the fore part of the taffrail; then through the block that hooks to the thimble, in the clue of the fail; again through the block on the horse, and belays to a cleat on the side.

Brails, 41, (*Plate IV. fig. 2.*) throat, middle, and peek, reeve through their respective blocks on the yard or gaff, and make fast to cringles on the after-leech of the fail on each side. The throat-brails lead down by the mast, and the middle brails lead down to the after-mizen-shroud on each side, and the peek-brails to a cleat on each quarter.

Fancy-line, 42, (*Plate IV. fig. 2.*) has two spans, with a thimble seized in the bight, and a thimble seized in each end; one thimble reeves upon the throat-brail, the other on the middle brail, on each side the fail. The fancy-line reeves through blocks lashed at the peek end, and each end bends to the thimble in the bight of the span on each side. When the mizen is set, the brails are hauled up by the fancy-line, that they may be slack, and not girt the lee-side of the fail.

Rigging and Bending the Topfails.

The *fore-topfail*, 6, (*Plate IV. fig. 2.*) is swayed up into the top by the topfail-haliards, that make fast to slings round the middle of the fail, and then laid in the fore part of the top fair for bending.

Sheets, 44, (*Plate IV. fig. 2.*) are passed through the fore part of the clue of the fail, and stoft with an overhand-knot. They reeve through the shoulder-block at the lower yard, then through the quarter-block, and come down before the mast; reeve through the sheave-holes in the bitts, and there belay.

Clue-lines, 45, (*Plate IV. fig. 2.*) The straps of the blocks are passed through the clues of the fail, and brought round the clue to the fore part, and securely seized. The clue-lines are passed the same as the clue-garnets of the courses, and sometimes have no block, but bend to the clue of the fail.

Bow-lines, 46, (*Plate IV. fig. 2.*) reeve through the blocks at the bowprit-cap. The outer part reeves on the lower bow-line bridle with a thimble, as the main-course. The leading-part comes in upon the forecattle, and belays to the topfail-sheet-bitts.

Bunt-lines, 47, (*Plate IV. fig. 2.*) reeve through the block upon the yard, lead down on the fore-side of the fail, and clinch to the cringles in the foot-ropes. The leading-part reeves through a single block, lashed close under the topmast cross-trees, leads down through the square hole in the top, and belays to the shrouds.

Reef-tackle-pendants, 48, (*Plate IV. fig. 2.*) reeve through the upper sheave in the sister-block in the topmast-shrouds,

then through the sheave-hole in the yard-arm, and clinch to the reef-cringle in the leech-rope of the fail.

Reef-earings reeve through their bights in each reef-cringle, and are stoft to the next cringles and the head of the fail, till used.

Spilling-lines have two legs, which are each made fast with a timber-litch round the quarters of the topfail-yard, then lead down on the aftside, return upwards under the foot of the fail, and reeve through a block on the fore-side, lashed to the tye-block on the yard, then lead down upon deck abast the mast.

Life-lines, *earings*, *rope-bands*, and *points*, as the fore-course.

Gaskets.—The yard-arm gasket reeves with an eye round the yard-arm, within the cleats. Quarter-gaskets reeve as the above, between the yard-arm and slings. Bunt-gaskets have two legs, and lash to the yard with an eye on each side the tye-block, and fasten thereto, when the fail is hauled up in the bunt.

The *MAIN-TOPFAIL*, 2, (*Plate IV. fig. 2.*) is swayed up into the top, as the fore-topfail.

Sheets, 51, *clue-lines*, 52, *bunt-lines*, 53, *reef-tackle pendants*, 54, *earings*, *rope-bands*, *points*, and *gaskets*, as the fore-topfail.

Bow-lines reeve through blocks lashed round the fore-mast-head, close under the cap; the outer part reeves on the lower bowline-bridle with a thimble, as the fore-topfail. The leading-part comes down through the square hole of the cap, reeves through a sheave-hole in the bitts upon the forecattle, and there belays.

The *MIZEN-TOPFAIL*, 10, (*Plate IV. fig. 2.*) in large ships, is swayed as the foregoing.

Sheets, 56, *clue-lines*, 57, *bunt-lines*, 58, *reef-tackle pendants*, 59, *earings*, *rope-bands*, *points*, and *gaskets*, as the fore-topfail.

Bow-lines, 60, (*Plate IV. fig. 2.*) bend to the fail as the fore-topfail, and reeve through a single block, seized to the main-shrouds on the opposite side near the futtock-staff; then lead down through a seizing-truck to the quarter-deck, and belay to the rack at the shrouds.

Rigging and Bending the Top-gallant Sails.

The *FORE-TOP-GALLANT-SAIL*, 7, (*Plate IV. fig. 2.*) is either swayed up to the topmast cross-trees by the clue-lines, or bent to the yard upon deck. It is hauled out to the yard-arm by earings, and bends or laces to the yard, as before observed.

Sheets, 62, and *clue-lines*, 63, are bent to the clues of the fail, and lead down upon deck, as the fore-topfail.

Bunt-lines, 64, reeve through a small block, seized to the top-gallant-mast-head; then through a thimble seized to the tye, close down upon the yard, and bend, with legs, to cringles in the foot of the fail. The leading-part comes down into the top.

Bow-lines, 65, (*Plate IV. fig. 2.*) reeve through the thimbles at the jib-boom-end, and fasten to the fail as the topfail, only with a toggle, to cast off the bow-line readily for fending the yard down. The leading-part comes down the forecattle, and belays to a pin in the hook over the bow-sprit.

The jack-block is strapped with a seizing-eye, through which reeves a short piece of rope, with an eye spliced in one end, and a double walnut-knot made at the end, called a button and loop, which encircles the mast, by thrusting the knot through the eye, and is triced up and down the mast by the top-gallant-tye, which bends through the eye of

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of the strap. It is used for fending the top-gallant-yards up or down. When the yard is swayed up, the top-rope reeves through the jack-block, and makes fast with a hitch round the yard in the slings, then flopt at the outer quarter to the eye-bolt in the yard-arm. When lowered, the same, except the stop at the eye-bolt. The rigging is taken off or put on by the men at the mast-head, when the yards are swayed up or lowered down.

The MAIN-TOP-GALLANT-SAIL, 3, (*Plate IV. fig. 2.*) rigs and bends as the former. Bow-lines, 67, reeve through the sheave-holes in the after-ends of the fore-top-mast cross-trees, and lead down upon deck. *Sheets*, 68, *clue-lines*, 69, *bunt-lines*, 70, *Plate II. fig. 2.*

The MIZEN-TOP-GALLANT-SAIL, 11, rigs and bends as the former. Bow-lines, 72, reeve through the sheave-holes in the after-end of the main-topmast cross-trees.

Rigging and Bending the Royals.

Royals, fore, 8, main, 4, and mizen, 12, (*Plate IV. fig. 2.*) are set flying; the clues lashed to the top-gallant yard-arms.

When royal masts are used, the royals rig similar to top-gallant fails.

Rigging and Bending the Jib and Stayfails.

Jib, 7, (*Plate IV. fig. 1.*) bends to its stay with hank and seizings.

Stay, 57, reeves through the upper sheave of the cheek-block at the fore-topmast-head, from aft on the starboard side, then through the hanks, and clinches to the traveller on the boom; a double block is then turned in the lower end, and its fall reeves through it; and a single block, lashed to the after-end of the fore-mast trestle-trees, leads down upon deck, and belays to the bitts abaft the fore-mast.

Haliards, 58, reeve through the lower sheave of the cheek-block at the fore-topmast-head, from aft on the starboard side, and bend to the head of the fail. The leading-part leads abaft the top to the aft part of the fore-castle. Large ships have a single block turned into the lower end of the haliards, and a whip-fall; the standing-part makes fast into the side.

Sheets, 59.—The bight is bent to the clue of the fail, and a single block turned in each inner end, that reeves a whip-fall. The standing-part makes into the side, and the leading-part leads in upon the fore-castle, and belays to a timber-head, or a cleat before the shrouds on each side.

Downhauler, 60, reeves through a small block lashed to the traveller, then leads upwards through the hanks, and bends to the head of the jib. The leading-part leads in upon the fore-castle.

Outhauler reeves through a sheave-hole at the outer end of the jib-boom, and clinches to the span-shackle of the traveller. The inner end has a double block turned in, which reeves with its fall to a single block, hooked to an eye-bolt in the fore part of the bowsprit-cap, and the fall leads in on the fore-castle.

Inhauler reeves through a small block lashed on the traveller. The standing-part makes fast to an eye-bolt in the side of the bowsprit-cap, and the leading-part comes in upon the fore-castle.

The FORE-TOPMAST-STAYSAIL, 6, (*Plate IV. fig. 2.*) bends to its stay with hanks and seizings. *Stay*, 62, reeves through the hanks, then makes fast with a running-eye round the bowsprit, between the collars and the spritsail-yard; then reeves through the upper sheave of the cheek-block, at the fore-topmast-head, on the larboard side; the

lower end has a double block turned in, and reeves with its fall to a single block lashed at the after-end of the fore-mast trestle-trees, leads upon deck, and belays to the bitts abaft the fore-mast.

Haliards, 63, reeve through the lower sheave of the cheek-block at the fore-topmast-head, on the larboard side, and bend to the head of the fail. The leading-part leads down abaft the top to the after-part of the fore-castle, and belays to a cleat in the side.

Sheets, 64.—The bight is bent to the clue of the fail, and leads through a single block, lashed to an eye-bolt on each side of the fore-castle.

Downhauler, 65, reeves through a small block that lashes at the tack of the fail, then leads up through the hanks, and bends to the head of the fail; and the leading-part comes in upon the fore-castle.

Outhauler reeves through a block lashed at the outer end of the bowsprit; the standing-part makes fast to the tack of the fail, and the leading-part comes in upon the fore-castle.

FORE-STAYSAIL, 5, (*Plate IV. fig. 1.*) bends to the preventer-stay with hanks and seizings.

Haliards, 67, reeve through a single block bent to the head of the fail. The standing-part makes fast round the head of the fore-mast; and the leading-part reeves through a block lashed to the rigging under the top, and leads down abaft the mast.

Sheets, 68, are doubled, and the bight put through the clue of the fail; and a single block spliced in each end. The standing-part of the fail is made fast round a timber-head on the fore-castle or eye-bolt, and the leading-part comes in through a block made fast to the laid eye-bolt.

Tack, 69, bends to the tack of the fail, and lashes the tack of the fail to the stay near the heart.

Downhauler, 70, reeves up through the hanks, bends to the head of the fail, and leads in upon the fore-castle through a single block lashed near the tack.

MAIN-STAYSAIL, 1, (*Plate IV. fig. 1.*) is seldom bent in ships but at sea, though commonly in brigs. It bends to the main-stayfail stay with hanks and seizings.

Stay, 72, has its upper end clinched round the main-mast-head above the rigging, and the lower end set up with a luff-tackle round the foremast.

Haliards, 73, reeve through a single block lashed to the head of the fail. The standing-part makes fast at the main-mast-head, and the leading-part reeves through a block lashed to the rigging under the top, and leads down abaft the mast; a double block is turned in to the end, and connected, by its fall, to a single block, hooked to an eye-bolt in the side abaft the mast.

Sheets, 74, are doubled, the bight is put through the clue of the fail, and the ends through the bight. A block is spliced into each end, and the standing-part of each fall makes fast on its respective side at the fore part of the quarter-deck, and the leading-part through a snatch-block. Sometimes a luff-tackle is clapt on to bowse the sheets aft.

Tacks, 75, bend to the tack of the fail, and lash the tack of the fail to the foremast, or the bitts abaft it.

Downhauler, 76, reeves up through the hanks, bends to the head of the fail, and belays to the main-top bowline bitts.

MAIN-TOPMAST-STAYSAIL, 2, (*Plate IV. fig. 1.*) bends to the main-topmast preventer-stay with hanks and seizings.

Haliards, 78, reeve from the aftside through the cheek-block at the main-topmast-head on the larboard side, come

RIGGING.

down and bend to the head of the fail. The leading-part reeves through a block in the side.

Sheets, 79, are doubled, the bight is put through the clue of the fail, and the ends through the bight. A block is spliced in each end, and the standing-part of each fall makes fast on its respective side to the boat-skid beam next before the quarter-deck, and the leading-parts reeve through a block on the gunwale abaft the gangway, and belays to a pin in the boat-skid beam.

Tacks, 80, are doubled, the bight is put through the tack of the fail, and the ends reeve through the bight, and lead through a thimble seized to the lower shrouds on each side; they lead down and belay to a shroud-cleat.

Brails, 81, reeve through blocks lashed to the strap of the main-bowline-block, and through blocks seized to the topmast preventer-stay, at the cat-harpins on each side, and then make fast on each side the fail to a cringle on the after-leech.

Sheets, 82, are doubled, the bight is put through the clue of the fail, and the ends through the bight. A block is spliced in each end, and the standing-part of each fall is made fast on its respective side to the boat-skid beam next the quarter-deck, and the leading-part reeves through a block on the gunwale on each side abaft the gangway.

Tacks, 83, are doubled, the bight is put through the tack of the fail, and the ends through the bight, and lead through a thimble seized on the lower shrouds on each side; they then lead down and belay to one of the shroud-cleats.

MIDDLE-STAYSAIL, 3, (*Plate IV. fig. 1.*) bends to the middle-stay-fail-stay with hanks and seizings.

Stay, 85. The standing-part reeves through the hanks, and makes fast to a thimble seized in a strap or grommet made fast round the fore-topmast-head, below the parrel. The leading-part reeves through the upper sheave-hole at the main-topmast-head: a double block is then turned into the end, and connects by its fall with a single block, that lashes to the main-trestle-trees, and the fall by which it is set up leads upon deck abaft the mast.

Haliards, 86, reeve through the lower sheave of the check-block at the main-topmast-head, and bend to the head of the fail; the other end leads upon deck abaft the mast.

Sheets, 87, are doubled, the bight is put through the clue of the fail, and the ends through the bight, and lead down through a block on each side near the gangway.

Tacks, 88, are doubled, the bight is put through the tack of the fail, and the ends through the bight, and each end through a thimble seized in the fore-topmast-shrouds, and belays in the top.

Downhauler, 89, reeves through a single block seized to the stay at the neck of the fail, then leads up through the hanks, and bends to the head of the fail, and the lower end comes down upon deck abaft the mast.

Tricing-line clinches to the grommet round the fore-topmast, and reeves through a block under the fore-topmast-cross-trees, and leads down into the top.

MAIN-TOP-GALLANT-STAYSAIL, 4, (*Plate IV. fig. 1.*) bends to the stay, or main-top-gallant-stay, in small ships, with hanks and seizings.

Stay, 91. The upper end splices into the top-gallant-stay below the rigging, and the lower end reeves through a thimble seized to the fore-topmast-cross-trees, leading down into the top.

Haliards, 92, reeve through a sheave-hole above the hounds of the main-top-gallant-mast, and bend to the head of the fail; the leading-part comes down upon deck, and belays to the bits abaft the main-mast.

Sheets, 92, and *tacks*, 93, as the middle stay-fail.

Downhauler, 94, reeves up through the hanks, and bends to the head of the fail; and the leading-part comes upon deck abaft the fore-mast.

MIZEN-STAYSAIL, 8, (*Plate IV. fig. 1.*) bends to the mizen-stay-fail stay with hanks and seizings.

Stay, 96, hitches round the head of the mizen-mast, then reeves through a thimble seized in a collar lashed round the main-mast, and sets up with a lanard through a thimble turned in to the stay, and an eye-bolt in the deck abaft the mast.

Haliards, 97, reeve through a block at the head of the fail, the standing-part makes fast round the mizen-mast-head, and the leading-part reeves through a block lashed to the trestle-trees, and through a block in the side at the deck.

Sheets, 98, bend to the clue of the fail with a long and short leg, having a thimble spliced in the latter. The long leg reeves through a block in the side, and through the thimble in the short leg, and belays to the rack at the side.

Tack, 99, splices to the tack of the fail, and lashes it to an eye-bolt in the deck abaft the mizen-mast.

Downhauler, 100, reeves through a block made fast to the collar of the stay, then upwards through the hanks, and bends to the head of the fail, and belays to the fore-brace bits.

Brails, 101, reeve through blocks lashed on each side the collar, then through thimbles in a strap put through the fail, and make fast to a cringle on the after-leech. The leading-part belays a-breast of the quarter-deck.

MIZEN-TOPMAST-STAYSAIL, 9, (*Plate IV. fig. 1.*) bends to the mizen-topmast-stay with hanks and seizings.

Haliards, 103, reeve through the sheave-hole in the topmast above the rigging, or through a block lashed round the mast-head; one end bends to the head of the fail, the lower end leads down upon deck abaft the mast.

Sheets, 104, are doubled, the bight put through the clue of the fail, and the ends through the bight; then through a thimble seized in the mizen-shrouds on each side, and lead down and belay to a pin in the shroud-rack.

Tacks, 105, are doubled, the bight put through the tack of the fail, and the ends through the bight, then through a thimble seized to the main-topmast-shrouds on each side, and lead down and belay in the top.

Downhauler, 106, reeves up through the hanks, and bends to the head of the fail; the lower end leads down upon deck, and belays at the fore part of the quarter-deck.

MIZEN-TOP-GALLANT-STAYSAIL, 10, (*Plate IV. fig. 1.*) bends to the mizen-top-gallant-stay with hanks and seizings.

Haliard, 108, reeves through the sheave-hole above its top-gallant-mast hounds; one end bends to the head of the fail, the lower end leads down upon deck abaft the mast.

Sheets, 109, are doubled, the bight put through the clue of the fail, and the ends through the bight, and lead down upon deck through a thimble seized in the mizen-shrouds, on each side near the cat-harpins, and belay to a pin in the shroud-rack.

Tacks, 110, bend to the tack of the fail as the sheets, and lead down into the top through a thimble seized in the main-topmast-shrouds on each side.

Downhauler, 111, reeves up through the hanks, and bends to the head of the fail, the lower end comes into the main-top, and belays to the top-rail.

RIGGING.

Rigging and Bending the Studding-Sails.

Studding-fails bend their yards at the head with rope-bands, the same as other square fails.

Lower studding-fails, main, 15, (Plate IV. fig. 2.) Outer haliards, 61, reeve through a span-block hitched round the lower cap, and through a block at the lower yard-arm or boom-iron, and bend between the cleats of the studding-fail-yard; the other end leads down upon deck.

Inner haliards, 62, bend to the upper inner cringle on the head of the fail, then reeve through a tail-block made fast round the quarter of the lower yard, then through another block made fast round the yard near the mast, and lead down upon deck.

Sheets, 63, are doubled, the bight is put over, and the ends through the inner clue on the foot of the fail; one leads forward, and the other aft.

Fore-studding-fail, 18, (Plate IV. fig. 2.) sets flying, or with a boom at the foot. If flying, the foot of the fail spreads on a yard, that rigs with a span clinched round each yard-arm. A guy is bent to an eye that is crossed in the middle of the span, and leads aft through a block lashed to the main-chains, leads in through a port, and belays round a cleat in the waist. The fail thus rigged has no tacks. Booms rig as follow: the hook in the inner end hooks to an eye-bolt between the fore-chains and cat-head, and the hook of the main-studding-fail-boom in an eye of an iron strap on the fore part of the main channel; the end is confined down with a lashing to the chain-plates; the inner end of the fore-boom is confined down with a tackle, made fast round the inner end of the boom, and the lower block is hooked to an eye-bolt in the wale; the guy clinches round the middle of the boom, reeves through a block lashed round the spritsail-yard, and leads in upon the forecastle.

TOPMAST-STUDDING-SAILS, Main, 16, Fore, 19, (Pl. IV. fig. 2.) *Haliards, 90, 91,* reeve through a block in the span round the topmast-head, under the cap, and through the jewel-block, at the outer end of the top-fail-yard-arm, and bend to the topmast-studding-fail-yard; the other end leads down upon deck, and belays to the bits next the mast.

Sheets are doubled, the bight is put through the inner clue, and the ends through the bight. The after-sheet, 92, of the fore-topmast-studding-fail leads in abaft the fore-shrouds, and the fore-sheet, 93, leads in upon the forecastle. The after-sheet, 94, of the main-topmast-studding-fail leads down to the quarter-deck, and the fore-sheet, 95, upon the gangway.

Tacks, 73, bend to the outer clue of the fail, reeve through a block lashed to the outer end of the boom, and lead aft through a block at the gangway. *Tack, 74,* of the main-topmast-studding-fail leads in upon the after-part of the quarter-deck through a block lashed upon the quarter.

Downhauler, 75, reeves through a block lashed to the outer clue of the fail, and through a thimble on the outer leech: it is then made fast to the topmast-studding-fail-yard, just within the earing, and leads into the waist.

The Booms, 76, 77, are run out by the tackles. The strap of the double-block makes fast through a hole in the heel of the boom, and the outer block to the boom-iron, and the fall leads along the yard. On the middle of the boom is fastened a selvagee, or a strap with a thimble, to which is hooked the top-burton-tackle, to support the boom in the middle.

TOP-GALLANT-STUDDING-SAILS; fore, 20, main, 17,

(*Plate IV. fig. 2.*) *Haliard* reeves through a block seized round the head of the top-gallant-mast, above the hounds or rigging, then through the jewel-block, strap with a thimble through an eye-bolt at the ends of the top-gallant-yards, and bends to the top-gallant-studding-fail-yard; the other end leads down the mast into the top.

Sheets, 80, are doubled, the bight is put through the lower inner clue of the fail, and the ends through the bight; one end leads forward, and makes fast to the quarter of the top-fail-yard, and the other end leads into the top, and belays to the topmast-shrouds.

Tacks, 81, bend to the outer clue of the fail, and reeve through a thimble in a strap round the outer end of the topmast-studding-fail-boom; and in merchant ships that have no boom, through a thimble in a strap round the outer yard-arm of the topmast-studding-fail. The fore-top-gallant-studding-fail-tack leads aft to the main-chains, and the main leads to the quarter-piece.

Downhauler, 82, makes fast to the outer yard-arm within the caring, and leads down into the top.

Rigging and Bending the Spritsail-Course.

The spritsail-course, 13, (*Plate IV. fig. 2.*) bends to its yard as the fore-course.

Sheets, double, 84, reeve through a block seized to the clue of the fail; the standing-part clinches to an eye-bolt in the bow, and the leading-part comes in on the forecastle.

Sheets, single, 85, bend to the clue of the fail, and lead in-board.

Clue-lines, 85, reeve through the blocks upon the yard, and bend or reeve through a block at the clue of the fail, and lead in upon the forecastle.

Bunt-lines, double, 86, reeve through the block on the yard, and clinch to the cringles at the foot of the fail, and lead in upon the forecastle.

Bunt-lines, single, 87, reeve through a block in the flings of the yard, and clinch with legs to the cringles in the foot of the fail, and lead in upon the forecastle.

Rigging and Bending the Spritsail-Topfail.

The spritsail-topfail, 14, (*Plate IV. fig. 2.*) bends to the yard with lacing and earings.

Sheets, 88, reeve through the sheet-block at the spritsail-yard-arm, and hook to the clue of the fail, and lead in upon the forecastle, through a block lashed on each side of the bowsprit.

Clue-lines, 89, the same as the spritsail.

Rigging and Bending the Driver or Spanker-fail, 11, Plate IV. fig. 1.

This fail is only used occasionally, and is bent or hoisted in a temporary manner, thus; it is made fast at the peek, 113, and nock, 114, with an earing, as the mizen, and makes fast to the yard and gaff with four or five pairs of haliards, that reeve through blocks made fast with tails round the yard and gaff, one end of the haliard being bent to the head of the fail. The throat-haliards, 115, reeve with a double and single block: the former is made fast round the mast-head, and the latter hooks to the nock-cringles on the fail.

Sheet, 116, reeves through a block or sheave-hole at the outer end of the boom, and bends to the clue of the fail; a luff-tackle is cat's-pawed to the other end of the sheet; the inner block hooks to the taffarel, and the fall leads in upon the quarter-deck. When this fail is bent to the mast, yard, or gaff, instead of the mizen, it bends exactly the same, only the foot of the fail is extended on the boom, as above.

Tack,

Tack, 117, is set tight with a luff-tackle, that hooks to the cringle in the tack of the sail, and to an eye-bolt in the throat of the boom.

Downhauler, 118, reeves through a block made fast to the middle of the driver-yard, and leads down to the taffarel.

Rigging of Snows, Brigs, &c.

A *Snow* has her sails and rigging on the fore and main-mast, similar to those on the same mast in a ship. The braces of the yards on the main-mast lead forward. The tryfail abaft the main-mast bends to the tryfail-mast, similar to the mizen of a ship.

Vessels in the navy resembling snows have a rope-horse, that sets up abaft the main-mast, with dead-eyes and a lamard, to an eye-bolt in the deck, to which the tryfail is bent by hanks and seizings, similar to the tryfail of a snow.

Brigs.—The rigging of a brig differs little from the fore and main-mast of a ship; the braces of yards on the main-mast lead forward. The after-main-shroud is served from the mast-head to the dead-eye, to prevent its being chafed by the main-boom and gaff. The after-backstay is fitted with a tackle, that it may be slackened when the main-sail jibes, or is bowfed forward by the boom-pendant and tackle.

BOOM-TOPPING-LIFT is taken up on the starboard side, and reeved through an iron-bound block, hooked to the upper eye-bolt on the aftside of the main-mast-head, then leads down and reeves through a block at the after-end of the boom. The standing-part clinches round the mast-head, or hooks to an eye-bolt near the block; the leading-part comes down and has a double block spliced or turned in, that connects by its fall to a single block that hooks to an eye-bolt in the after-part of the channel. Sometimes it has the addition of a runner.

Main-sheet reeves through a double block, strapped round the boom within the taffarel, and through another double block, strapped round the horse inside the taffarel, and belays to a large cleat, or the pin in the sheet-block of small vessels. Large vessels sometimes have a treble block on the horse.

Tack-tackle has the double block fastened to the tack of the sail, and connects with its fall to a single block hooked to an eye-bolt in the deck.

Guy-pendants have a hook and thimble, that hook in a thimble of a strap on the boom, just without the main-sheet-block. In the inner end of the pendant, is a thimble or long-eye spliced, to which is hooked a luff-tackle, which is hooked to an eye-bolt in the side before the mast, and the fall leads in-board.

GAFF-TOPPING-LIFT rigs similar to the boom above, only it has a span upon the gaff, and the block at the mast-head hooks to the eye-bolt, next below the boom-topping-lift; and the

Haliard connects it to an eye-bolt in the deck or side, the same as the boom.

Inner tye is similar to the above, and hooks to an eye-bolt in the jaws of the gaff, then reeves through an iron-bound block, that hooks to an eye-bolt in the mast-head below the above. It has a double block spliced or turned in to the lower end, and sets up by the haliards, the lower block hooking to an eye-bolt on the opposite side to the tye above.

Peek-downhauler reeves through a small block, strapped with a thimble to the eye-bolt at the outer end of the gaff, and belays round a cleat under the boom.

Throat-downhauler reeves through a block at the nock of the sail, and leads down the aftside of the mast.

MAIN-SAIL bends at the head to the gaff with lacing and earings, and is seized to the hoops round the mast, through the holes in the fore-leech.

Throat-downhauler.—The double block hooks to an eye-bolt under the throat of the gaff, that connects by its fall to a single block hooked to the thimble, seized in the bight of a strap round the mast under the boom fiddle.

Sheet-rope splices in the clue of the sail, and reeves through a sheave-hole in the boom; and a thimble is turned in to the inner end, to which hooks the sheet or luff-tackle, and the inner block to a strap round the boom near the jaws. When the sail is hoisted out, it is lashed with an earing through the clue, and an eye-bolt in the boom-end.

Tricing-line reeves through a small block made fast to an eye-bolt in the throat of the gaff; one end splices to the tack of the sail, the other end leads down upon deck, and belays to a cleat on the mast.

Rigging of Cutters or Vessels with one Mast.

The different articles before the mast rig similar to ships, and the shrouds, boom, &c. as the brigs.

GAFF-TOPSAIL laces to a small gaff at the head.

Haliards reeve through a sheave-hole at the top-gallant-mast-head, and bend to the inner quarter of the gaff; the leading-part comes down upon deck.

Topping-lift reeves through a sheave-hole, or small block, seized to the top-gallant-head, then through a thimble or small block seized at the outer end of the gaff; the standing-part clinches round the top-gallant-mast-head above the sheave-hole, and the leading-part comes down upon deck.

Sheet reeves through a thimble seized at the peek of the main-sail, and bends to the clue of the sail, and leads down upon deck.

Tack makes fast to the tack of the sail, a little above the rigging.

Saveall topsail.—The clues lash near the lift-block of the cross-jack-yard.

Haliards bend to the earings of the sail, and reeve through a block on each quarter of the topsail-yard, and lead down upon deck.

RINGTAIL-SAIL bends to a small yard on the head, and is hoisted by the peek-downhauler, abaft the main-sail. The foot is expanded on a small boom, or spar, lashed to the outer end of the main-boom.

WATER-SAIL bends on the head to a small yard.

Haliards reeve through a small block lashed under the outer end of the main-boom, and make fast to the middle of the yard, and the leading-part belays round a cleat on the taffarel.

Sheets make fast to the clues of the sail, and lead in over the quarters.

MIZEN is set on a small mast over the stern. If a square-sail, it bends to a yard at the head, and is hoisted by a *haliard* reeved through a sheave-hole at its mast-head, and is spread by *sheets* at the foot. If a spritsail, its fore-leech bends to the mast with grommets, and is spread or peeked with a sprit, and the foot hauls aft by the sheet to a small boom.

RIGGING, *Serving the*. See RIGGING.

RIGHT, RECTUM, in *Logic* and *Ethics*.

In this sense the word stands opposed to *wrong*, *erroneous*, *false*, &c.

RIGHT, in *Geometry*, something that lies evenly, without inclining or bending one way or another.

Thus, a *right line* is that whose several points all tend the same way, or which lies evenly between its extremes.

In this sense, *right* signifies as much as *straight*, and stands opposed to *curved* or *crooked*.

RIGHT *Angle*. See ANGLE.

In this sense, the word *right* stands opposed to *oblique*.

RIGHT-*Angled* is understood of a figure, when its sides are at right angles, or stand perpendicularly one upon another.

This sometimes holds in all the angles of the figure, as in squares and rectangles; sometimes only in part, as in right-angled triangles.

RIGHT *Cone*. See CONE.

RIGHT-*Lined Angle*. See ANGLE.

RIGHT *Sine*. See SINE. The word here stands contradistinguished to *versed*.

RIGHT *Ascension*, in *Astronomy*. See ASCENSION.

RIGHT *Ascension*, *Angle of*. See ANGLE.

RIGHT *Ascension*, *Parallax of*. See PARALLAX.

RIGHT *Descension*. See DESCENSION.

RIGHT *Descension*, *Parallax of*. See PARALLAX.

RIGHT *Sphere* is that where the equator cuts the horizon at right angles: or, that in which the poles are in the horizon, and the equator is in the zenith.

Such is the position of the sphere with regard to those who live directly under the equator. The consequences of which position are, that they have no latitude, nor elevation of the pole. They can see nearly both poles of the world; all the stars rise, culminate, and set, with them; and the sun always rises and descends at right angles to their horizon, and makes their days and nights equal.

In a right sphere the horizon is a meridian; and, if the sphere be supposed to revolve, all the meridians successively become horizons, one after another.

RIGHT *Circle*, in the *Stereographical Projection of the Sphere*, is a circle at right angles to the plane of projection, or that which passes through the eye. See PROJECTION.

RIGHT *Sailing* is when a voyage is performed on some one of the four cardinal points.

If a ship sail under the meridian, that is, on the north or south points, she varies not in longitude at all, but only changes the latitude, and that just so much as the number of degrees she has run.

If a ship sail under the equinoctial upon the very east or west points, she alters not her latitude at all, but only changes the longitude, and that just so much as the number of degrees she hath run.

If she sail directly east or west, under any parallel, she there also altereth not her latitude, but only the longitude; yet that not according to the number of degrees of the great circle she hath sailed in, as under the equinoctial, but more according as the parallel is remoter from the equinoctial towards the pole. For the less any parallel is, the greater is the difference of longitude.

RIGHT, *Jus*, in *Law*, signifies not only a property, for which a writ of right lies, but also any title or claim, either by virtue of a condition, mortgage, or the like, for which no action is given by law, but only an entry.

Such are *jus proprietatis*, a right of property; *jus possessionis*, a right of possession; and *jus proprietatis et possessionis*, a right both of property and possession.

This last was formerly called *jus duplicatum*. As if a man be disseised of an acre of land, the disseisee has *jus proprietatis*; the disseisor hath *jus possessionis*; and, if the disseisee release to the disseisor, he hath *jus proprietatis et possessionis*. See *JUS*.

RIGHT, *Hereditary*. See HEREDITARY.

RIGHT, *Petition of*. See PETITION.

RIGHT, *Pretensed*. See PRETENSED.

RIGHT of *Reformation*. See REFORMATION.

RIGHT, *Writ of*. See WRIT and RECTO.

RIGHT in *Court*. See RECTUS in *Curia*.

RIGHT *Distillation*. See DISTILLATION.

RIGHTING, in *Sea Language*, denotes the act of restoring a ship to her upright position, after she has been laid on a careen. This is generally the natural effect of casting loose the careening pulleys, by which she had been drawn down. But it is sometimes necessary to apply mechanical powers to right the ship in such a situation; and the principal of these are the relieving tackles.

A ship is said also to right at sea, when she rises with her masts erected, after having been prest down on one side by the effort of her sails, or a heavy squall of wind. Falconer.

RIGHTING, when expressed of the *helm*, implies the replacing it amidships, after it has been put over to the side in tacking or otherwise.

RIGHTS, *Bill of*, in *Law*, is a declaration, delivered by the lords and commons to the prince and princess of Orange, February, 13 1688; and afterwards enacted in parliament, when they became king and queen. This declaration sets forth, that king James II. did, by the assistance of divers evil counsellors, endeavour to subvert the laws and liberties of this kingdom, by exercising a power of dispensing with and suspending of laws; by levying money for the use of the crown, by pretence of prerogative, without consent of parliament; by prosecuting those who petitioned the king, and discouraging petitions; by raising and keeping a standing army, in time of peace; by violating the freedom of election of members to serve in parliament; by violent prosecutions in the court of king's bench; and causing partial and corrupt jurors to be returned on trials, excessive bail to be taken, excessive fines to be imposed, and cruel punishments inflicted; all which were declared to be illegal. And the declaration concludes in these remarkable words, "And they do claim, demand, and insist upon, all and singular the premises, as their undoubted rights and liberties." And the act of parliament itself (1 W. & M. stat. 2. cap. 2.) recognizes "all and singular the rights and liberties asserted and claimed in the said declaration to be the true, ancient, and indubitable rights of the people of this kingdom."

RIGIACUM, in *Ancient Geography*, a town of Belgic Gaul, and capital of the Atrebatii. Ptolemy.

RIGID MARBLE. See MARBLE.

RIGIDITY, among *Philosophers*, a brittle hardness; or that kind of hardness supposed to arise from the mutual indentation of the component particles within one another.

Rigidity is opposed to ductility, malleability, &c.

RIGLAND, in *Geography*, a town of Germany, in the margraviate of Anspach; 7 miles N. of Anspach.

RIGLET. See REGLET.

RIGNAC, in *Geography*, a town of France, in the department of the Aveyron, and chief place of a canton, in the district of Rodes; 12 miles W.N.W. of Rodes. The place contains 851, and the canton 7182 inhabitants, on a territory of 202½ kilometres, in 16 communes.

RIGNEY, a town of France, in the department of the Dôubs; 10 miles N.E. of Besançon.

RIGNEY *le Seron*, a town of France, in the department of the Aube; 6 miles N.W. of Ervy. N. lat. 48° 12'. E. long. 3° 43'.

RIGNY, a town of France, in the department of the Indre and Loire; 6 miles N.N.E. of Chinon.

RIGO, a small island in the West Indies, near the N.W. coast of Porto Rico.

RIGODUNUM, in *Ancient Geography*, a town of Britain,

tain, in the country of the Brigantes, placed by Camden and Baxter at Ribchester in Lancashire; but Horsley prefers Manchester or Warrington. See RIBCHESTER.

RIGOLL, or REGALS, a kind of musical instrument, consisting of several sticks bound together, only separated by beads. It makes a tolerable harmony, being well struck with a ball at the end of a stick.

Such is the account which Grassineau gives of this instrument.

Skinner, upon the authority of an old English dictionary, represents it as a clavichord, or clarichord; possibly founding his opinion on the nature of the office of the tuner of the regals, who still subsists in the establishment of the king's chapel at St. James's, and whose business is to keep the organ of the chapel royal in tune; and not knowing that such wind instruments as the organ need frequent tuning, as well as the clavichord and other stringed instruments.

Sir Henry Spelman derives the word *rigol* from the Italian *rigabello*, a musical instrument, anciently used in churches instead of the organ.

Walther, in his description of the regal, makes it to be a reed-work in an organ, with metal and also wooden pipes, and bellows, adapted to it. And he adds, that the name of it is supposed to be owing to its having been presented by the inventor to some king.

From an account of the regal, used in Germany, and other parts of Europe, it appears to consist of pipes and keys on one side, and the bellows and wind-chest on the other.

We may add, that lord Bacon (Nat. Hist. cent. ii. § 102.) distinguishes between the regal and organ, in a manner which shews them to be instruments of the same class. Upon the whole there is reason to conclude, that the *regal*, or *rigol*, was a pneumatic, and not a stringed instrument.

Merfennus relates that the Flemings invented an instrument, *les regales de bois*, consisting of seventeen cylindrical pieces of wood, decreasing gradually in length, so as to produce a succession of tones and semitones in the diatonic series, which had keys, and was played on as a spinnet; the hint of which, he says, was taken from an instrument in use among the Turks, consisting of twelve wooden cylinders, of different lengths, strung together, which, being suspended, and struck with a stick, having a ball at the end, produced music. Hawkins's Hist. Mus. vol. ii. p. 449. See REGAL.

RIGOMAGUS, in *Geography*, a town of Italy, in Liguria, at a small distance N. of Aita.

RIGOR, in *Medicine*, a *shivering*, or the slight convulsive tremors, attended by a sensation of cold, which occur either from actual exposure to cold, or from that condition of the body which usually precedes a paroxysm of fever, or which, it should rather be said, constitutes one of the first symptoms of a febrile paroxysm. (See FEVER.) There is often no absolute diminution of the heat in the body, when this sensation of cold, and even actual shivering, with a disposition to sit near a fire, or to be loaded with blankets, occur. It arises, therefore, from some peculiar affection of the brain and nervous system, and not from actual deficiency of heat. This is farther proved by the circumstance, that a similar tremor, or *rigor*, is capable of being temporarily excited by certain impressions upon the sensorium; as by certain sights, or even thoughts, that excite horror: whence, indeed, the word *horror* is applied by medical writers in nearly the same sense with *rigor*.

Rigor, or chilliness, precedes or commences the attack of almost all febrile and inflammatory diseases; whence the vulgar, mistaking the first symptom for the cause, ascribe all these diseases to the agency of *cold*, the operation of

which they conceive to have been accomplished at the time when the *rigor* occurred. It takes place at the beginning of quinsy, pleurisy, peripneumony, and all the organic inflammations; at the commencement of almost all fevers; and at each such successive paroxysm or even exacerbation of intermittent, remittent, and hectic fevers: it constitutes the most striking feature, indeed, of the intermittent fever, which is hence called the *ague* by the common people, in contradistinction from the *fever*, or hot fit, which ensues. The tremor and clattering of the teeth are often so great, indeed, in the cold fit of an ague, as to shake the bed and its furniture about the patient. It made even Cæsar tremble.

“ He had a fever when he was in Spain,
And, when the fit was on him, I did mark
How he did shake: 'tis true, this god did shake.”
Shakspeare.

The rigor is a symptom still more notorious in pathology, as having been the foundation of Dr. Cullen's whole theory of fever. That physician maintained, that the rigor, or *cold fit*, having been produced by the sedative influence of the common causes of fever on the brain, became itself the cause of the succeeding *hot* and *sweating* stages, by rousing the heart and arteries to greater actions, in order to throw back the load of blood into the extreme vessels, which had been driven to the centre by the constriction of the latter, while the *rigor* lasted. The reader will find this doctrine stated, and refuted, under the article FEVER, and the head *Cullenian Theory*. It is not difficult to shew, respecting this, as well as the vulgar opinion, that the *rigor*, like the heat, and the sweating, is one in the chain of *effects*, and not a *cause* of the phenomena which ensue. But it would be equally difficult to explain the immediate cause of any of them.

RIGOSA, in *Geography*, a town of Italy, in the department of the Serio; 3 miles N.N.W. of Bergamo.

RIGOURISTS, in *Ecclesiastical History*. See JANSENISM.

RIGUSA, in *Ancient Geography*, a town of Spain, in the Tarragonensis, belonging to the Carpetani. Ptolemy.

RIK, in *Geography*, a town of Persia, in the province of Irak; 12 miles N. of Isfahan.

RIKEBACH, a town of Germany, in the county of Bregentz; 7 miles S.S.E. of Bregentz.

RIKIKES, a town of Thibet; 35 miles S. of Deu-prag.

RIL, a town of Africa, in Darfur; 60 miles S.S.E. of Cobbé.

RILANDA, a town of Sweden, in the province of Upland; 28 miles N.E. of Stockholm.

RILEY, JOHN, in *Biography*, a portrait painter, and the best which England had produced prior to sir Joshua Reynolds. He was born in London in 1646. After the death of Lely he obtained very considerable esteem and employment. He painted the portraits of king Charles II., James II. and his queen, and was appointed by James state-painter. His style is composed from Vandyke and Lely, and his execution is free and masterly, and bears an air of originality. He died in 1691, at the age of 45.

RILL, or RIVULET. See RIVER.

RILL, in *Agriculture*, a small runlet of water, mostly rising on the sides of small hills or declivities. In many situations they may be converted to useful purposes in husbandry, such as the irrigation of pasture or meadow lands that lie below their levels; the supplying of grass grounds with water, for the purposes of live-stock; and the afford-

ing it to towns and villages, in dry or other situations where it is scarce. See IRRIGATION, WATERING of Land, and the following article.

RILLS, Artificial, such as have been formed or made by means of art. It has been remarked, that the practice of constructing rivulets of this sort for supplying water is peculiar to a few districts of this country, as Yorkshire and west Devonshire, in the latter of which they have been made use of time immemorial in bringing what, in the simple language of the district, is termed "pot-water" to the farm-houses, and the hamlets of cottages in upland situations; an excellent expedient, which is supposed applicable in many other parts of the island, but which, except in the case of Yorkshire, has hitherto been confined to that extreme part of the country.

And in forming these sorts of rills in their original district, it is observed by Mr. Marshall, that one which supplies the house with water, also a drinking-pool near the yard, and in the natural course of it conveying it through a straw yard, a trough is placed across it for the use of the yard cattle; and which has, likewise, been for a vast length of time led over some grass land, which lies below the yards, on the principle of the float and drain. But that although this rill is seldom, if ever, dried up, leading it along the sides of the valley, through upland inclosures, which are destitute of water for stock, and their value of course thereby much depreciated, does not appear to have been thought of. In the course of the summer of 1792, being desirous to know if this rill could be carried through an intended suite of yards on the side of the valley, he took the level, and found not only that object to be attainable, but also that it might be led with ease into two waterless fields which lie above these yards; and, through them, into four or five more (equally in want of water for stock) situated beyond them. It is added that, in ascertaining these facts, he made use of a mason's long level inverted, a plummet-hole being previously cut in the head of the standard; the crown of which being set upon the ground, the arms of the level were steadied by rods in the horizontal position; and a carpenter's rule held across another rod, set up, at as great a distance as a clear sight would admit of, and at a height upon the staff equal to the height of the level. Finding this a most simple and perfect instrument, but difficult to adjust, by reason of its instability, he has since had a *frame-level* made on the same principle; namely, with a straight edge, or top rail, answering to the base-board of the long level, with a broad piece falling down from the middle of it, answering to the standard; and with two end-pieces or legs, to supersede the use of the rods, together with a bottom rail, eight or nine inches from the ground, and with diagonal braces to keep the whole firm, and prevent the middle or plumb-line from getting out of the square with the straight edge of the top rail; which is seven or eight feet long, and the height about four feet. He thinks that half a rod long, and a quarter of a rod high, are eligible dimensions when great accuracy is required. But a shorter length, as one-third of a rod, is more handy. And, as an improvement of the rule and rod, he has contrived a *cross-staff*; namely, a slip of thin deal, about five feet and a half long, with a cross-piece about two feet long and three inches wide, fixed in the edge of it, at the exact height of the level; the top of the staff rising twelve or eighteen inches above the upper edge of the cross-piece, that the hand of the person who holds it up may not interfere with the view. This cross-piece should be of white wood, as deal, or be painted white, that it may be more distinctly seen at a distance. With this implement the flowing level may be well ascertained.

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And it is observed that, in order to ascertain the proper fall of a rill of this intention, he previously took the running level of the ancient floating *leat* of the meadow, and finding its fall irregular, he took it in two places where the variations were greatest. In the first, the fall was twenty-seven inches in one hundred and ten feet; which is nearly one inch, or one foot of fall to fifty inches, or fifty feet, in length. In this part the current is in a degree rapid; the fall much too great for the general intention. The fall in one hundred and ten feet of the other part is barely six inches; which is only one measure of perpendicular height to two hundred and twenty of horizontal length. But in this part the motion is too sluggish; the surface of the water is nearly smooth; barely dimpling; no ripple or agitation appears. The fall is evidently too little for a water course, in which there is not a constant stream. He has therefore fixed upon one measure in a hundred, as the proper fall of a water-course, into which water is occasionally thrown for the purposes of watering lands, filling drinking-pools, cisterns, and other similar purposes. And in order to adjust the level to this descent, he measured one hundred feet in length, and having nicely ascertained the *dead level*, he depressed the range of the top bar one foot below the upper edge of the cross-piece of the staff, and, while in that position, he marked the situation of the plumb-line on the face of the level, the plummet-hole being made wide for this purpose; thus fixing the flowing level. And with this descent, he has traced a line from an intended reservoir, and from point to point, through the fields of one side of the farm, and finds that it reaches, even with this descent, within every field; and that three-fourths, or a larger proportion, of the surface are capable of being flooded from this intended pool. With the view of seeing the actual motion of water falling one in a hundred, he has had fifty yards of the upper end of the line opened, and finds the current fully sufficient; a lively rippling stream, more active, perhaps, than is necessary. But the leakage being the less the quicker the water moves, it may, he thinks, be safely concluded that one foot of fall in a hundred feet length is nearly the proper degree that is required.

And in the same case he has, by the same means, also found that, from a similar reservoir formed near the source of the rill, water might be conveyed to every field, and almost every acre of the opposite side of the farm, which is a matter of great consequence. It is suggested, that the uses of these reservoirs will be those of having in readiness, during the summer months, when the rill is weak, a body of water to throw into drinking-pools, cisterns, &c.; a weak current turned into a dry trench is absorbed by its perforations and fissures, for some time, at least, after it is turned in; whereas a body of water, rushing quickly along it, not only in part escapes absorption, but tends to fill up the leaks; and, in winter, these reservoirs will be useful in scouring the trenches, and in hoarding up bodies of water for the purpose of irrigation, or other similar uses. In the setting out of these rills, he has laid the head or upper end of each, from two to three feet below the intended surfaces of their respective reservoirs, when full. Hence, by the means of a porteculis flood-gate, a body of water two or three feet deep, and the whole extent of the surfaces of the basons, may be poured into the rills, faster or slower, as may be requisite. And in a subsequent minute it is stated, that difficulties were met with in conducting a rill through an open grove of trees, but which were overcome in the following manner; having, by means of the frame level and cross, ascertained the general descent, or flowing level, through the whole extent of the grove; and having, in this

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operation, gained a general idea of the requisite direction of the rill, by means of stakes placed at the several stations of the cross-staff, wherever clear views could be caught through the openings between the trees, the intermediate spaces between the stakes were traced by the eye, so as to endeavour to follow the natural level of the ground, without forming abrupt bends in the channel: parrying between the two. And that the supposed line being thus set out, the surface of the ground was cleared two or three feet wide on either side of it, from leaves and other incumbrances, and the top soil removed for manure; thus making a hollow pathway through the grove, four or five feet wide. The next operation was to level this pathway, which was likewise done by the eye, from stake to stake; paring off the protuberances, and casting or wheeling them into the hollows to fill them up. Then in order to come at the true line, and to render the flowing level perfectly uniform, a narrow pathlet, the width of the spade, was formed on the upper side of the broad pathway. This pathlet was formed with the frame level in hand, sinking trenches in the still protuberating parts, and raising banklets in the hollows; thus fixing the exact flowing level at each level's length, and, at the same time, forming the face or lower side of it, in such manner as to ease the bends, and give a smooth flowing line to the rill or rivulet of the water. And further, in order to bring the business of forming the bed of the rill to a certainty, and thereby to render any further superintendance unnecessary, yet to prevent error in the execution, he formed a *gauge* for the labourers to work by; which consisted of a board, forming the segment of a circle; the chord or greatest length being three feet, the greatest depth twelve inches. This gives the dimensions of the bed of the rill. To keep the bottom of it exactly true to the flowing level, so that the current stream may be perfectly uniform, it is fixed under a mason's short level; the end of one of the arms projecting three or four inches beyond one end of the gauge. And the trench being sunk to nearly its proper depth, by the eye kept on the adjusted margin, the projecting end of the level is placed on the same marginal guide, and the plummet-line being brought to the perpendicular, (and the base of the level of course rendered horizontal,) the bottom of the trench is finished with certainty.

Upon having the water turned into the upper part of the trench thus formed, by two common labourers, who never before, perhaps, took a level in their hands, the current was found not only desirable as to descent, but perfectly uniform, without alteration. And hence the practicability and certainty of this method of forming the channels of rills, as well as the eligibility of one measure in a hundred, for the descent or fall, are fully ascertained. It is observed that the above dimensions are the most proper for the part passing under trees, as being liable to fill up, by leaves and small twigs; but in open land, liable to be trodden by cattle, four feet in width, and eight inches deep is better, the lower side being made broad and flatly convex to prevent treading in, being turfed over with the sods removed.

But in respect to the Yorkshire rills, the same writer remarks that the heights of the northern margin have neither springs nor rivulets (some very few instances excepted), nor any other natural waters than the brooks which wind at the bottom of the deep vallies that divide them, and the rivulets which generally run at the feet of the precipices that terminate them. That formerly these brooks and rivulets were the only resources which the villages that are scattered on these heights had for water, both for the use of cattle and for domestic purposes. But that in process of time wells were sunk, but they are of such a depth as to make the

labour of raising the water little less than that of fetching it from a moderate distance. Of course that this kind of natural necessity has led to an expedient which, though not new in principle, is perhaps entirely so in simplicity of execution, and might be practised with great advantage in many similar situations. For as the moorland mountains rise with generally an easy ascent, from the beds of the rivulets last-mentioned, to a height much exceeding that of the hills to be watered, frequently abounding with springs almost to their highest swells, these springs are collected and conducted by a narrow channel down the slope of the mountain sides, and along the face of the precipice, until the summit be gained; the waters being thence conveyed to the place or places desired. It is stated that, in planning an artificial rill, a level, and some little knowledge of the country, are, as has been seen, the requisite guides. The surveyor begins at the place to which the water is required to be brought, and ascertains the lowest part of the brink of the precipice from which water can be conducted. The face of the precipice is traced in like manner; and, if necessary, the ascent of the moorland hills, until springs, or their natural rills, can be commanded. And that if his level bring him to the bottom of the steep soon enough to catch the rivulet which runs at its foot, the work is readily completed. If not, he goes above its highest bend, generally to the head or highest part of the valley (between the heights and the moorlands), and winds along the side of the opposite swell to some more elevated source. And if, when he arrives on the moorland hills (or, by an observation from the top of the precipice,) he finds that nature does not furnish the requisite quantity of water high enough to give the necessary fall, the work is, of course, impracticable.

But in regard to the manner of executing an artificial rill in this part, an opening shallow channel, of a width proportioned to the quantity of water to be conducted, is the main operation. In making stagnant pools, it has been found that much art is necessary to make them retentive, but in forming the bed of a rill no such art is requisite. It is the nature of running waters to render the surface on which they run firm and retentive. Sand is, he believes, the chief material used in forming the channels of these rills; and this only in places where an open rock or other porous stratum is crossed. But much depends on the quantity of fall and the quantity of water. If the fall be but little, and the quantity of water at the source be such as not to admit of much waste, great care is requisite in forming the bed of the rill. The fall is therefore regulated in a great degree by the quality of the ground. On good ground the channel is nearly level. Over faulty ground the water runs with a current for the double purpose of getting quickly over it, and rendering its channel more retentive. The circumstances from which injuries are produced in these rills are leaves in autumn and snows in winter. To remove the obstructions which these not unfrequently cause, and to repair such breaches as time will always make in the work of art, a superintendant is necessary to every artificial rill.

And it is observed that the rill of Kirby moor-side is, he believes, the largest, and was the first which was brought upon these heights. This rill was brought to the villages of Gillimore and Fadmore near forty years ago; and has been extended to Kirby about thirty years, by Joseph Ford, a self-taught engineer of great ingenuity and some judgment; a man to whom the country owes much. Since the introduction of this, several others have been raised; and some few unsuccessful attempts have been made; the channel was, in one instance, (that of Newton,) extended a considerable way before the impracticability of completing it

was discovered; a piece of misconduct which nothing but a want of accuracy in the use of the level can lead to. The miscarriage, in this case, was not owing to a want of elevation in the source, but to a depression of the channel at the foot of the steep; the head of the valley (if such it may be called) being lower than the top of the precipice at the given point. This shews the necessity of tracing the entire channel with sufficient accuracy before any other expence is incurred. The mode of doing which has been shewn above.

It is likewise further stated, that in the case of Kirby the channel is raised somewhat by a bridge-like mound of earth thrown across the crown of the valley. And that the same mound serves the purpose of conducting another rill across the same difficult pass; from whence the Kirby rill takes an eastward, the rill of Welburn (applied principally to the watering of pasture grounds) a westward direction.

Also in regard to the expence, it is stated that the first cost of the Kirby rill was not altogether one hundred pounds. The distance about ten miles, watering (besides the town of Kirby) two villages and a line of cultivated waterless upland country about four miles in length. Besides the first cost, which was raised by subscription, a superintendent had ten pounds a-year for keeping it in repair and free from obstructions; which yearly salary is paid by the contributions of the persons benefited; each being rated agreeably to the estimated benefit received.

It may be noticed, that from the vast advantages that have been derived from the construction of these sorts of rivulets, in these few cases of upland dry situations, the attention of the land proprietor and farmer in other districts where there is a prevalent scarcity of water, either for domestic purposes, or the use of cattle stock, should be directed to the execution of them, on such cheap and beneficial plans as may be the most convenient in the particular situations. See POND.

These kinds of rills should, in all cases where they are capable of it, be turned to the purpose of watering land, as well as the uses noticed above.

RILLE, in *Geography*, a town of France, in the department of the Maine and Loire; 9 miles E. of Baugé.—Also, a river of France, which runs into the Seine, six miles below Quilbœuf.

RILLY, a town of France, in the department of the Marne; 6 miles S. of Reims.

RILSK, a town of Russia, in the government of Kursk, on the Sem; 52 miles W.S.W. of Kursk. N. lat. $51^{\circ} 30'$. E. long. $34^{\circ} 54'$.

RIM, in a watch or clock, the circumference or circular part of a wheel.

RIMS, in *Ship Building*, compass-pieces of timber, which form the quarter-galleries between the floos.

RIMS, a skirting of elm-board round the upper side of ships' tops.

RIM, a cast-iron frame, in which the dropping-palls of the capstan traverses, and palls, or counteracts the efforts of the capstan.

RIMA literally denotes a fissure or chink. See FISSURE, and RHAGADES.

Hence, it is applied to several parts of the body, that bear a resemblance thereto; as *rima pudendi*, *fissura magna*, the same with vulva; and *rima laryngis*, the aperture of the larynx, called the *glottis*.

RIMA is also used for a narrow aperture of a small cavity under the fornix, opening into the infundibulum; called also the third ventricle of the brain.

RIMA, in *Geography*, a river of Hungary, which runs into the Theysse, near Bolgar.

RIMAC, a river of Peru, which passes by Lima, in a valley to which it gives name, on which Lima is built, and runs into the Pacific ocean, S. lat. 12° .

RIMAGIONE, a town of Genoa; 5 miles S.S.W. of Spezza.

RIMASZOMBAT, a town of Hungary; 14 miles E.S.E. of Altfol.

RIMBA, a province of Benguela, in Africa, on the banks of the Morano.

RIMBACH, a town of the duchy of Wurzburg; 3 miles S. of Volkach.

RIMBU, a town of Thibet; 71 miles W. of Lassa. N. lat. $30^{\circ} 35'$. E. long. $80^{\circ} 50'$.

RIME, in *Poetry*. See RHYME.

RIME, in *Rural Economy*, a sort of hoary or white frosty appearance, sometimes on the ground in the autumnal winter and early spring mornings.

RIMENANT, in *Geography*, a town of France, in the department of the Two Nethes; two miles E. of Malines.

RIMERS are moveable bars to support the sluices and over-falls in opening-weirs.

RIMFORSA, in *Geography*, a town of Sweden, in West Gothland; 17 miles S. of Linköping.

RIMINI, a sea-port town of Italy, capital of the department of the Rubicon, late in the Romagna; formerly situated on the sea, but the sea has for some centuries receded to a distance. The harbour on the river Marechia, on which the city is built, is now so choaked up with sand, as scarcely to admit of small barks. This city was once very flourishing, but besides other calamities which have befallen it, it suffered extremely from an earthquake in 1671. It is the see of a bishop, suffragan of Ravenna. This is the ancient Ariminum, the first town of which Cæsar took possession, after passing the Rubicon. In the market-place there is a kind of stone pedestal, with an inscription, declaring, that upon it Cæsar had stood and harangued his army; but the authenticity of this is not ascertained to the satisfaction of antiquaries. Besides this suggestion of doubtful antiquity, here is a triumphal arch, erected to the emperor Augustus, and the remains of an amphitheatre. This city is said to have been built 500 years earlier than Rome itself, and to have been made a colony in the year of Rome 483. It derived its name from the river Arminius, which washed its walls, and separated the Via Flaminia from the Via Æmilia. Two councils were held here, one of orthodox bishops, in the year 358, and another in the following year, of Arian prelates. Vitalien, governor of the city for the emperor Justinian, defended it against Vitiges, king of the Goths, with such vigour, as to oblige the Goths to raise the siege. Some time after it became subject to the Lombards; but when their last king, Didier, was conquered and taken prisoner by Charles the Great, Rimini returned to the allegiance of the western emperors. The liberality of Otho III. conferred the dominion of it on the Malatesta family: at last the Venetians gained possession of it, and by a treaty with pope Julius II. gave it to the holy see. The harbour at Rimini was formerly famous, being covered with marble, and of such extent, as to contain a considerable fleet; but its mouth being filled up with sand, Sigismond Pandolfo Malatesta destroyed it, and with the marble stones, raised out of its ruins, built the Franciscan church, which is the finest in Rimini; 57 miles S.E. of Bologna. N. lat. $44^{\circ} 4'$. E. long. $12^{\circ} 38'$.

RIMIS, a small island in the Baltic, near the coast of Pomerania. N. lat. $54^{\circ} 11'$. E. long. $13^{\circ} 26'$.

RIMNIK. See RIBNIK.

RIMONT, a town of France, in the department of the Arriege; 8 miles W.N.W. of Tarascon.

RIN, in *Rural Economy*, a provincial word used to signify brine.

RINÆUS, in *Anatomy*. See NASALIS.

RINALDI, ODERIC, in *Biography*, a learned Italian ecclesiastical historian in the 17th century, was a native of Treviso, and entered the establishment belonging to the priests of the congregation of the Oratory at Rome, of which Baronius had been a member. After the death of that cardinal, Rinaldi undertook the laborious task of continuing his "Ecclesiastical Annals," from the year 1198, with which the work of Baronius terminated, to the year 1564, when the council of Trent had been dissolved. It abounds with many curious and valuable documents, taken from the archives at the Vatican, and other collections. It consists of ten large volumes in folio, which made their appearance in Rome at different periods, from 1646 to 1677. Rinaldi published a sufficiently copious abridgment, in Italian, of the whole annals, compiled both by Baronius and himself.

RINALDO DI CAPUA, an eminent Neapolitan composer, who flourished in the middle of the last century, and whose story is somewhat singular.

He was the natural son of a person of very high rank in that country, and at first only learned music as an accomplishment; but being left by his father with only a small fortune, which was soon dissipated, he was forced to make it his profession. He was but seventeen when he composed his first opera at Vienna.

In the course of a long life, Rinaldo experienced various vicissitudes of fortune, sometimes in vogue, sometimes neglected. However, finding old age coming on, he collected together his principal works, such as had been produced in the zenith of his fortune and fancy, thinking these would be a resource in distressful times; those times arrived; various misfortunes had happened to him and his family; when, behold! this resource, this sole resource, the accumulated produce of his pen, had by a graceless son been sold for waste paper!

This composer, whose productions were, during many years, the delight of all Europe, in 1770 was reduced at Rome to the utmost indigence. Diogenes the Cynic was never more meanly clad through choice, than Rinaldo through necessity: a patched coat, and stockings that wanted to be patched or darned! We, having often received great pleasure from his works, courted his acquaintance and conversation, which was very lively and intelligent; but though a good-natured man, his opinions were very singular and severe on his brother composers.

He thought they, at that time, "had nothing left within the reach of their invention to entitle them to reputation for novelty, but the refuse of thousands, which had been often tried and rejected, either as impracticable or displeasing. The only chance which a composer has for introducing new modulation in songs, was in a short second part, (every serious song then ended with a *da capo*,) in order to fright the hearer back to the first, to which it serves as a foil, by making it comparatively beautiful." He included himself in the censure, and frankly confessed, that though he had written full as much as his neighbours, yet out of all his works, perhaps not above one new melody could be found, which had

not been wire-drawn in different keys, and different measures, a thousand and a thousand times.

We subscribed to these opinions at the time, till we heard Haydn's quartets and symphonies, Paesello's vocal compositions, and Mozart's latter works, vocal and instrumental.

Rinaldo censured, with great severity, the noise and tumult of instruments in modern songs;—what would he say now to our double-drums and tromboni?

Rinaldo had the reputation at Rome of being the inventor of accompanied recitatives; but in searching for old compositions in the archives of San Girolamo della Carita, at Rome, we found an oratorio of Alessandro Scarlatti, which was composed at the latter end of the 17th century, before Rinaldo di Capua was born, and in which there are *accompanied recitatives*. But he did not, himself, pretend to the invention; all that he claimed was the being among the first who introduced ritornels, or interstitial symphonies, in recitatives of strong passion and distress, which express or imitate what it would be ridiculous for the voice to attempt. There have been since many fine scenes of this kind in the works of Jomelli, Perez, Galuppi, Sarti, Piccini, Sacchini, and Paesello.

Rinaldo seems to have been a successful composer from 1737 to 1758. His first serious opera at Rome was "Il Ciro Riconosciuto," in 1737; and "Adriano in Siria," the last, in 1758.

A very fine air from "Vologeso" was sung by Monticelli in England, and printed by Walsh among the favourite songs in the opera of Gianguir,—"*Nell' orror di notte oscura*,"—to which we refer as a specimen of his serious style. Indeed the whole scene in that opera, beginning by the accompanied recitative, "*Berenice, ove sei?*" and terminated by the air, "*Ombra che pallida*," is admirable, and a proof to what perfection dramatic music was brought in Italy fifty or sixty years ago; and the curious will do well to procure a copy of this scene whenever they have an opportunity.

It has been said, perhaps with some truth, that the science of this composer was not equal to his genius; for being educated as a dilettante, he probably did not submit to all the drudgery of dry study, which one intended for the profession of music is obliged to undergo.

RINAR, a word used by the chemists, to express filings of any thing.

RINAUR, in *Geography*, a town of Hindoostan, in Mysore; 25 miles E. of Chinna Balabarum.

RINCADROLEAN POINT, a cape on the W. coast of Ireland, in the county of Kerry. N. lat. $52^{\circ} 44'$. W. long. $10^{\circ} 13'$.

RIND, a skin of any fruit that may be cut off, or pared. The outer coat of the chestnut, set with prickles, is particularly called the *urchin-like rind*.

RIND is also used for the inner bark of trees; or that soft, whitish, juicy substance, adhering immediately to the wood.

Through this it is that the sap has been supposed to return from the extremities of the branches to the root: the vessels hereof are by some also supposed to do the office of arteries; whence Mr. Bradley calls them *arterial vessels*. See PLANTS.

RIND, *Grafting in the*. See ENGRAFTING.

RIND-Gall, a damage a tree receives when young, so that the bark or rind grows in the inner substance of the tree.

RINDE, in *Geography*, a river of Hindoostan, which runs into the Jumna, 15 miles S.E. of Corah.

RINDERA, in *Botany*. See *CYNOGLOSSUM levigatum*, n. 14.

RINDGE, or RINGE, in *Geography*, a town of America, in the county of Cheshire, New Hampshire, situated on the Massachusetts's line, about 80 miles W. of Portsmouth, and 70 N.W. of Bolton. This town was incorporated in 1768, and contains 1226 inhabitants. This township has 13 ponds of water of different sizes, in which are perch, trout, eels, &c. It has also, towards the northern part, a mine of ochre of a Spanish brown. One half of the water of this town runs to the Merrimack, and the other to the Connecticut river.

RINDOMS, a town of Spain, in Catalonia; 11 miles N.W. of Tarragona.

RINDSAKER, a town of Norway; 60 miles N.N.E. of Christiania.

RINEKENBERG, a town of the duchy of Carinthia; 6 miles E. of Wolkenmarck.

RINEUS MARINUS, a name given by some botanical writers to the crithmum, or samphire, a sea-plant, used as a pickle.

RING, ANNULUS, a little moveable, put on the finger, either by way of ceremony, or of ornament.

The bishop's ring makes a part of the pontifical apparatus; and is esteemed a pledge of the spiritual marriage between the bishop and his church.

The episcopal ring is of a very ancient standing. The fourth council of Toledo, held in 633, appoints that a bishop condemned by one council, and found afterwards innocent by a second, shall be restored, by giving him the ring, staff, &c.

From bishops, the custom of the ring has passed to cardinals, who are to pay a very great sum, *pro jure annuli cardinalitii*.

RINGS, *Origin of*. Pliny (lib. xxxvii. cap. 1.) observes, that we are in the dark as to the person who first invented, or wore the ring; because what is said of Prometheus, as also of Midas's ring, are fables. The first people among whom we find the ring in use, are the Hebrews, (Gen. xxxviii.) where Judah, Jacob's son, gives Tamar his ring, or signet, as a pledge of his promise; but the ring appears to have been in use at the same time among the Egyptians, from Gen. xli. where Pharaoh puts his ring upon Joseph's hand, as a mark of the power he gave him. And in the first book of Kings, chap. xxi. Jezebel seals the warrant she sent for the killing of Naboth, with the king's ring.

The ancient Chaldeans, Babylonians, Persians, and Greeks, had likewise the use of the ring; as appears from several passages in Scripture, and from Quintus Curtius, who tells us, that Alexander sealed the letters he wrote into Europe with his own seal; and those in Asia with Darius's ring.

The Persians will have Guiamschild, the fourth king of the first race, to have first introduced the ring, for sealing his letters and other acts. The Greeks, Pliny thinks, knew nothing of the ring in the time of the Trojan war; the reason he gives is, that we find no mention of it in Homer, but that when letters, &c. were to be sent away, they were tied up, and the strings knotted.

The Sabines had rings in Romulus's time; and it is to them, probably, the practice first came from the Greeks; and from them that it passed to the Romans; though it was some time before it got footing there. Pliny cannot learn which of the kings of Rome first adopted it; but there are no signs of it in any of their statutes, before those of Numa and Servius Tullius. He adds, that it was also in use among the ancient Gauls and Britons.

RINGS, *Matter of Ancient*. There were some of one single metal, and others of a mixture, or two. For the iron and silver were frequently gilt; or at least the gold part was fixed within the iron, as appears from Artemidorus, lib. ii. cap. 5. The Romans were contented with iron rings a long time; and Pliny assures us, that Marius first wore a gold one in his third consulate, which was in the year of Rome 650. Sometimes the ring was iron, and the seal gold; sometimes it was hollow, and sometimes solid; sometimes the stone was engraven, and sometimes plain; and the graving sometimes was in relief, and sometimes in creux: the last were called *gemmae clypeae*; the former *gemmae sculptura prominente*.

RING, *the manner of wearing the*, has been various. From Jeremiah, chap. xxii. it appears, that the Hebrews wore it on their right hand. Among the Romans, before they came to be adorned with stones, and while the graving was yet on the metal itself, every one wore them at pleasure, on what hand and finger he pleased. When stones came to be added, they wore them altogether on the left hand; and it would have been held an excessive foppery to have put them on the right.

Pliny says, they were at first worn on the fourth finger; then on the second or index; then on the little finger; and at last on all the fingers, excepting the middle one.

The Greeks wore them altogether on the fourth finger of the left hand, as we are informed by Aul. Gellius, lib. x. and the reason he gives for it is, that having found from anatomy, that this finger had a little nerve that went straight to the heart, they esteemed it the most honourable, by reason of this communication with that noble part. Pliny says, the Gauls and ancient Britons wore the ring on the middle finger.

At first they only wore a single ring, then one on each finger, and at length several on each finger. (Martial, lib. xi. epig. 60.) At last one on each joint of each finger. (Aristoph. in Nub. &c.) Their foppery at length arose to that pitch, that they had their weekly rings.

Juvenal, Sat. vii. speaks of *annuli semestres*; as also of winter and summer rings. But of all others, Lampridius, cap. 32. observes, that Heliogabalus carried the point farthest, who never wore the same ring, or the same shoe, twice.

Rings have been also worn in the nose, and as pendants in the ears. Bartholin has an express treatise, "De Annulis Narium," *Of Rings of the Nostrils*. St. Augustine assures us, it was in his time the fashion of the Moors; and Pietro della Valle observes the same of the modern orientals.

In effect, there is no part of the body where rings have not been worn. Several East India travellers affirm, that the natives now commonly wear them on their nose, lips, cheeks and chin. Ramusio tells us, that the ladies of Narsinguy, in the Levant, and Diodorus Siculus, lib. iii. that those of Ethiopia used to adorn their lips with iron rings.

As to the ears, the custom still obtains of wearing rings in them, both of men and women, almost all over the world. See PENDANT.

The Indians, particularly the Guzzarats, have worn rings on their feet. And when Peter Alvarez had his first audience of the king of Calicut, he found him all covered with stones set in rings, having bracelets and rings both on the hands and fingers, and even on the feet and toes.

Louis Bartome represents a king of Pegu as still more extravagant, having rings set with precious stones on every toe.

RINGS, *Use of*.—The ancients had three different kinds; the

the first served to distinguish conditions or quality. Pliny assures us, that the senators at first were not allowed to wear the gold ring, unless they had been ambassadors at some foreign court. Nor was it even allowed them to wear the gold ring which was given them in public, except on public occasions; at other times they wore an iron one. And those who had a triumph observed the same rules.

At length the senators and knights were allowed the common use of the gold ring; but Acron on Horace, lib. ii. fat. vii. observes, they could not do it unless it were given them by the prætor.

In after days the gold ring became the badge of the knights, the people wearing silver rings, and the slaves iron ones; though the gold ring was sometimes also allowed the people, and Severus granted it to his common soldiers. Augustus allowed it to the liberti or freedmen; and though Nero made a regulation to the contrary, yet it was soon set aside.

A second kind of rings comprehended the *annuli sponsaliti*, wedding-rings. Some carry the origin of this custom as far back as the Hebrews, on the authority of a text in Exodus, xxxv. 22. Leo of Modena, however, maintains, that the ancient Hebrews did not use any nuptial ring. Selden, in his *Uxor. Ebraica*, lib. ii. chap. xiv. owns, that they gave a ring in the marriage, but that it was only in lieu of a piece of money of the same value which had used to have been given before. The Greeks and Romans did the same, and from them the Christians took it up very early, as appears from Tertullian, and in some ancient liturgies, where we find the form of blessing the nuptial ring.

The third kind of rings included those used as seals, called *cerographi* or *cirographi*; an account of which, see under the article SEAL.

Richard, bishop of Salisbury, in his Constitutions, anno 1217, forbids the putting of rush rings, or any the like matter, on women's fingers, in order to the debauching them more readily; and he insinuates the reason of his prohibition, that there were some people weak enough to believe, that what was thus done in jest was a real marriage.

De Breveil, in his *Antiquities of Paris*, says, it was an ancient custom to use a rush-ring in the nuptials of such as had had an affair together before their marriage.

RING, in *Angling*, an instrument intended to free the hook when accidentally entangled among weeds. See ANGLING.

RING, in *Astronomy*. The ring of Saturn is a thin, broad, opaque, circular arch, encompassing the body of that planet, like the horizon of an artificial globe, without touching it, and appearing double, when seen through a good telescope.

The discovery of it is owing to M. Huygens, who, after frequent observation of Saturn, with telescopes which magnified two or three times more than any that had been before made, perceived two lucid points, or ansæ, arising out from the body in a right line.

Hence, as in subsequent observations, he always found the same appearance, he concluded that Saturn was encompassed with a permanent ring; and accordingly produced his new system of Saturn in 1659.

However, Galileo first discovered that the figure of Saturn was not round. It appeared to him like a large globe between two small ones; and he announced this discovery in the year 1610. Prosecuting his observations till the year 1612, he was then surpris'd to find only the middle globe; but in process of time he again discovered the globes on each side, which appeared to change their form; sometimes appearing round, sometimes like an acorn, some-

times semicircular, then with horns towards the globe in the middle, and growing by degrees so long and wide as to encompass it, as it were, with an oval ring. Huygens, who, as we have said, completed the discovery, makes the space between the globe of Saturn and the ring equal to, or rather bigger than, the breadth of the ring; and the greatest diameter of the ring, in proportion to that of the globe, as 9 to 4. But Mr. Pound, with an excellent micrometer, applied to the Huygenian telescope of 123 feet in length, determined this proportion to be as 7 to 3.

Mr. Whiston, in his "Memoirs of the Life of Dr. Clarke," informs us, that the doctor's father once saw a fixed star between the ring and the body of Saturn. M. Cassini, in 1675, observed upon the ring a dark elliptical line, dividing it, as it were, into two rings; the inner of which appeared brighter than the other. He also perceived a dark belt upon the planet, parallel to the greater axis of the ring. Mr. Hadley observed, that the outer part of the ring seem'd narrower than the inner part, and that the dark line was fainter towards its upper edge; he also saw two belts, and observed the shadow of the ring upon Saturn. In October, 1714, when the plane of the ring very nearly pass'd through the earth, and was approaching it, M. Maraldi observed, that while the arms were decreasing, both in length and breadth, the eastern arm appear'd a little larger than the other for three or four nights, and yet it vanish'd first; for after an interruption for two nights by clouds, he saw the western arm alone. This inequality of the ring made him suspect that it was not bounded by exactly parallel planes, and that it turned about its axis. In the sequel of this article we shall give the substance of Dr. Herschel's observations, which, on account of his accuracy as an observer, and the superior excellence of his telescopes, are much more important than any others, as he has discovered many circumstances which had escap'd all other observers.

This ring, seen from Saturn, appears like a large luminous arc in the heavens, as if it did not belong to the planet. When we see the ring most open, its shadow upon the planet is broadest; and from that time the shadow grows narrower, as the ring appears to do to us; until, by Saturn's annual motion, the sun comes to the plane of the ring, or even with its edge; which, being then directed towards us, becomes invisible, on account of its thinness.

The principal phenomena of Saturn's ring are familiarly illustrated by a view of *Plate XIX. Astronomy, fig. 14.* Let S be the sun, A B C D E F G H Saturn's orbit, and I K L M N O the earth's orbit. Both Saturn and the earth move according to the order of the letters; and when Saturn is at A, his ring is turned edgewise to the sun S, and he is then seen from the earth as if he had lost his ring, let the earth be in any part of the orbit whatever, except between N and O; for whilst it describes that space, Saturn is apparently so near the sun as to be hid in his beams. As Saturn goes from A to C, his ring appears more and more open to the earth; at C the ring appears most open of all; and seems to grow narrower and narrower as Saturn goes from C to E; and when he comes to E, the ring is again turned edgewise both to the sun and earth: and as neither of its sides is illuminated, it is invisible to us, because its edge is too thin to be perceptible; and Saturn appears again as if he had lost his ring. But as he goes from E to G, his ring opens more and more to our view on the under side; and seems just as open at G as it was at C; and may be seen in the night-time from the earth in any part of its orbit, except about M, when the sun hides the planet from our view. As

Saturn

Saturn goes from G to A, his ring turns more and more edgewise to us, and therefore it seems to grow narrower and narrower; and at A it disappears as before. Hence, while Saturn goes from A to E, the sun shines on the upper side of his ring, and the under side is dark; and whilst he goes from E to A, the sun shines on the under side of his ring, and the upper side is dark. The ring disappears twice in every annual revolution of Saturn, *viz.* when he is in 19th degree of Pisces and of Virgo, and when Saturn is in the middle between these points, or in the 19th degree either of Gemini or of Sagittarius, his ring appears most open to us; and then its longest diameter is to its shortest, as 9 to 4. Fergufon's *Astr. lect.* 204.

Dr. Herschel (*Phil. Transf.* for 1790, vol. lxxx. pt. 1.) observes, that the black disc, or belt, upon the ring of Saturn, which we have already mentioned, is not in the middle of its breadth; and that the ring is not subdivided by many such lines, as some astronomers have represented; but there is one single, dark, considerably broad line, belt, or zone, which he has constantly found on the north side of the ring. (See *Plate XIX. Astronomy, fig. 15.*) "Since the year 1774, to the present time," as Dr. Herschel says (*Phil. Transf.* for 1792, vol. lxxxii. pt. 1.) "I can find only four observations where any other black division of the ring is mentioned, than the one which I have constantly observed: these were all in June, 1780." As this dark belt is subject to no change, it is probably owing, as the doctor remarks, to some permanent construction of the surface of the ring. This belt cannot be the shadow of a chain of mountains, since it is visible all round on the ring; for at the ends of the axis there could be no shade visible on account of the direction of the sun's illumination, which would be in the line of the chain; and the same argument will hold against any caverns or concavities. It is, moreover, fully evident, that this dark zone is contained between two concentric circles, as all the phenomena answer to the projection of such a zone. Thus in *fig. 16*, we may see that the zone is continued all round the ring, with a gradual decrease of breadth towards the middle, answering to the appearance of a narrow circular plane, projected into an ellipsis. The matter of the ring is undoubtedly no less solid than the planet itself; and it is observed to cast a strong shadow upon the planet. The light of the ring is also generally brighter than that of the planet; for the ring appears sufficiently bright when the telescope affords scarcely light enough for Saturn. From many repeated observations, which we cannot here detail, Dr. Herschel establishes the fact of the extreme thinness of the ring. He farther observes, that there may be a refraction through a very rare atmosphere on the two planes of the ring, by which the satellite may be elevated and depressed, so as to become visible on both sides of the ring, even though the ring should be equal in thickness to the diameter of the smallest satellite, which may amount to 1000 miles. From a series of observations upon luminous points of this ring, (*Phil. Transf.* vol. lxxx. pt. 2.) he has discovered that it has a rotation about its axis, in $10^{\text{h}} 32' 15''.4$.

The ring is invisible when its plane passes through the sun, or the earth, or between them: in the first case, the sun shines only upon its edge, which is too thin to reflect sufficient light to render it visible; in the second case, the edge only being opposed to us, it is not visible, for the same reason; in the third case, the dark side of the ring is exposed to us, and therefore the edge being the only luminous part which is towards the earth, it is invisible, for the same reason as before. Observers have differed ten or twelve days as to the time of its becoming invisible, owing to the

difference of the telescopes, and of the state of the atmosphere. The disappearance of the ring seems to occur only with the telescopes in common use among astronomers; for Dr. Herschel, with his large telescopes, has been able to see it in every situation. He thinks the edge of the ring is not flat, but spherical, or spheroidal. He observes, that the ring was seen in his telescope, when we were turned towards the unenlightened side; so that he either saw the light reflected from the edge, or else the reflection of the light of Saturn upon the dark side of the ring, as we sometimes see the dark part of the moon. He cannot, however, say which of the two might be the case; especially as there are very strong reasons for thinking, that the edge of the ring is of such a nature as not to reflect much light. M. de la Lande thinks, that the ring is just visible, with the best telescopes in common use, when the sun is elevated 3' above its plane, or three days before its plane passes through the sun; and when the earth is elevated 2' 20" above the plane, or one day from the earth's passing it. In the *Phil. Transf.* for 1790, Dr. Herschel ventured to suggest a suspicion that the ring was divided; this conjecture was strengthened by subsequent observations, after he had an opportunity of seeing both sides of the ring. His reasons are these; 1st, the black division upon the northern side of the ring, is in the same place, of the same breadth, and at the same distance from the outer edge, that it always appeared upon the northern side; 2dly, with his seven-foot reflector and an excellent speculum, he saw the division in the ring, and the open space between the ring and the body, equally dark, and of the same colour with the heavens about the planet; 3dly, the black division is equally broad on each of the rings. From these observations, Dr. Herschel thinks himself authorized to say, that Saturn has two concentric rings, situated in one plane, which is probably not much inclined to the equator of the planet. The dimensions of the ring are in the following proportions, as nearly as they could be ascertained.

	Parts.
Inside diameter of the smaller ring	5900
Outside diameter	7510
Inside diameter of the largest ring	7740
Outside diameter	8300
Breadth of the inner ring	805
Breadth of the outer ring	280
Breadth of the space between the rings	115

M. de la Place, in the "*Mem. de l'Acad. at Paris*," supposes that the ring may have many divisions; but Dr. Herschel remarks, that no observations will justify this supposition.

From the mean of a great many measures of the diameter of the larger ring, Dr. Herschel makes it $46''.677$, at the mean distance of Saturn. Hence, its diameter : the diameter of the earth :: 25.8914 : 1. From the above proportions, therefore, the diameter of the ring must be upwards of 204,883 miles; and the distance of the two rings 2839 miles.

The ring being a circle, appears elliptical from its oblique position; and it appears most open, when Saturn is 90° from the nodes of the ring, upon the orbit of Saturn; or when Saturn's longitude is about $2^{\circ} 17'$, and $8^{\circ} 17'$. In such a situation, the lesser axis is very nearly equal to half the greater, when the observations are reduced to the sun; consequently the plane of the ring makes an angle of about 30° with the orbit of Saturn.

The breadth of the ring (as stated by Dr. Herschel, *Phil. Transf.* vol. xcvi. pt. 2. p. 467.) is to the space between the ring and the body of Saturn as about 5 to 4.

Kepler,

Kepler, in his *Epitom. Astron. Copern.*, and after him Dr. Halley, in his *Inquiry into the Causes of the Variation of the Needle*, *Phil. Trans.* N^o 195, suppose our earth may be composed of several crusts or shells, one within another, and concentric to each other. If this be the case, it is possible the ring of Saturn may be the fragment or remaining ruin of his former exterior shell, the rest of which is broken or fallen down upon the body of the planet.

RING is also the name of an instrument used in navigation, for taking the altitudes of the sun, &c.

It is usually of brass, about nine inches diameter, suspended by a little swivel, 45° from the point of which is a perforation, which is the centre of a quadrant of 90°, divided in the inner concave surface.

To use it, they hold it up by the swivel, and turn it to the sun, till the sun-beams, falling through the hole, make a spot among the degrees, which marks the altitude required.

This instrument is preferred to the astrolabe, because the divisions are here larger than on the astrolabe. See *ASTROLABE*.

RING is also used for the sound or tone of a bell; which see.

The ringing of bells, though now a recreation chiefly of the lower class of people, is a very curious exercise. As for the tolling of a bell, this is nothing more than the producing of a sound by the stroke of the clapper against the side of a bell; the bell itself being in a pendant position, and at rest. In ringing, the bell, by means of a wheel and rope, is elevated to a perpendicular: in its motion to this situation, the clapper strikes forcibly on one side, and, in its return downwards, on the other side of the bell, producing at each stroke a sound. The music of bells is altogether melody; but the pleasure arising from it consists in the variety of interchanges, and the various succession and general predominance of the consonances in the sounds produced.

The practice of ringing bells in change is said to be peculiar to this country, which for this reason is called the ringing island; but the antiquity of it is not easily ascertained. There are in London several societies of ringers, particularly one known by the name of the College Youths. Merfennus has said nothing of the ringing of bells in changes; and Kircher has only calculated the possible combinations arising from a given number. See *ALTERNATIONS*.

In England, the practice of ringing is reduced to a science; and peals have been composed, which bear the names of the inventors. Some of the most celebrated peals now known were composed about fifty years ago, by Mr. Patrick, so well known as the maker of barometers.

For the method of ringing in the Low Countries, see *CARILLONS*.

RING, or *Annulus*, in *Geometry*. See *ANNULUS*.

The area of the ring included between the circumferences, *A B P A*, *D E Q D*, of two concentric circles, (*Plate XII. Geometry, fig. 12.*) is obtained by the rule given under *ANNULUS*: viz. Multiply the sum of the diameters by their difference, and the product by .7854, and the ultimate product will be the area required: for the ring being equal to the difference of the two circles, if the diameters be called *D*, *d*, and .785398, &c. = *a*, we shall have the ring = $a D^2 - a d^2 = a \times \overline{D+d} \times \overline{D-d}$. Hence if *DW* be a perpendicular to the radius *CDA*, DW^2 will be equal to $\overline{AD} \times \overline{AC+CD} = \overline{D-d} \times \overline{D+d}$, and $a DW^2$, or the area of a circle whose radius is *DW*, will

be = $a D^2 - a d^2 =$ the area of the ring. Hence also it appears, that the ring is equal to an ellipse whose axes are $\overline{D+d}$ and $\overline{D-d}$. See *ELLIPSE*.

The area of the ring may also be had, by multiplying half the sum of the circumferences by half the difference of the diameters, the product being the area. For the circumferences are equal to $4aD$, $4ad$: therefore $a \times \overline{D+d} = \frac{1}{4} C + \frac{1}{4} c$; which, by substitution in the last rule, will give $a \times \overline{D+d} \times \overline{D-d} = \frac{1}{4} C + \frac{1}{4} c \times \overline{D-d} = \frac{1}{2} C + \frac{1}{2} c \times \frac{1}{2} \overline{D-d}$, as in the rule. The same rule will serve also for a part of the ring, *ABEDA*, included between the parts, *AD*, *BE*, of two radii, using for *C* and *c* the lengths of the intercepted arcs.

Another rule for finding the area of the ring is as follows: Multiply the perpendicular breadth of the ring, that is, the difference of the radii, by the circumference *RST*, (or part *RS* for the part *ABEDA*,) having the same centre with, and equally distant from, the bounding arcs. For this circumference, being equally distant from the other two, will be equal to half their sum. Hence the whole ring, or any part of it *ABEDA*, included between two radii, is equal to a parallelogram on the same base *AD*, and whose altitude is equal to *RS*, the middle circumference.

RING, *Solid*, is a solid returning into itself; of which every section perpendicular to the axis, or line passing through the middle, of the solid, is every where the same figure, and of the same magnitude.

To find the Surface of a solid Ring.—Multiply the axis by the perimeter of a section perpendicular to it, and the product will be the surface. *E. gr.* a workman having made for a jeweller a circular ring, or a ring whose axis forms the circumference of a circle; it is required to find the expence of the gilding, at a penny the square inch; the thickness of the ring, or the diameter of a section of it, being 2 inches; and the inner diameter, across from side to side, 18 inches. Here $18 + 2 = 20 =$ the diameter of the circle formed by the axis; and consequently $20 \times 3.14159 =$ the length of the axis. But $2 \times 3.14159 =$ the circumference of a section of it; therefore $20 \times 3.14159 \times 2 \times 3.14159 = 40 \times 3.14159^2 = 394.785$ square inches, nearly, = 394.785 pence = 1*l.* 12*s.* 10½*d.* nearly, the expence required.

To find the Solidity of a Ring.—Multiply the axis by a section perpendicular to it, and the product will be the solidity. *E. gr.* required the price of a ring of iron, whose dimensions are the same with those in the last example, at four-pence a pound; a cubic inch of iron weighing 4.423 ounces avoirdupois. Here the area of a section being $2^2 \times .785398 = 3.14159$, which expresses half the circumference, and the axis being the same as before, the solidity will evidently be expressed by half the surface in the last example; i. e. the solidity = 197.3925 cubic inches, which multiplied by 4.423, gives 873.065 ounces = 54.56657 pounds; which, at 4*d.* each, will amount to 18*s.* 2¾*d.*, the price required.

It is needless to multiply examples, as the mode of operation is the same in all forms, with those for prisms, both with regard to the surfaces and solidities: for it is evident that any ring is equal to a prism, whose altitude and end are respectively equal to the axis and section of the ring, both as to surface and solidity, and, therefore, the rules for them both must be the same; and, on this account, any demonstration of the rules for rings is unnecessary. Hutton's *Menfuration*.

RINGS of Colours, in *Optics*, a phenomenon first observed

in thin plates of various substances, by Mr. Boyle, and Dr. Hooke, but afterwards more fully explained by Sir Isaac Newton. Mr. Boyle having exhibited a variety of colours in colourless liquors, by shaking them till they rose in bubbles, as well as in bubbles of soap and water, and also in turpentine, procured glass blown so thin as to exhibit similar colours; and he observes, that a feather of a proper shape and size, and also a black ribband held at a proper distance between his eye and the sun, shewed a variety of little rainbows, as he calls them, with very vivid colours. Boyle's Works by Shaw, vol. ii. p. 70.

Dr. Hooke, about nine years after the publication of Mr. Boyle's Treatise on Colours, exhibited the coloured bubble of soap and water, and observed, that though at first it appeared white and clear, yet as the film of water became thinner, there appeared upon it all the colours of the rainbow. He also described the beautiful colours that appear in thin plates of Muscovy glass; which appeared, through the microscope, to be ranged in rings surrounding the white specks or flaws in them, and with the same order of colours as those of the rainbow, and which were often repeated ten times. He also took two thin pieces of glass, ground plain and polished, and putting them one upon another, pressed them till there began to appear a red coloured spot in the middle; and pressing them closer, he observed several rings of colours encompassing the first place, till, at last, all the colours disappeared out of the middle of the circles, and the central spot appeared white. The first colour that appeared was red, then yellow, then green, then blue, then purple, then red again; yellow, green, blue, and purple; and again in the same order, so that he sometimes counted nine or ten of these circles, the red immediately next to the purple; and the last colour that appeared before the white was blue; so that it began with red, and ended with purple. These rings, he says, would change their places, by changing the position of the eye, so that, the glasses remaining the same, that part which was red in one position of the eye, was blue in a second, green in the third, &c. Birch's Hist. of the Royal Society, vol. iii. p. 54.

Sir Isaac Newton, having demonstrated that every different colour consists of rays which have a different and specific degree of refrangibility, and that natural bodies appear of this or that colour, according to their disposition to reflect this or that species of rays (see COLOUR), pursued the hint suggested by the experiments of Dr. Hooke, already recited, and casually noticed by himself, with regard to thin transparent substances. Upon compressing two prisms hard together, in order to make their sides touch one another, he observed, that in the place of contact they were perfectly transparent, which appeared like a dark spot; and when it was looked through, it seemed like a hole in that air, which was formed into a thin plate, by being impressed between the glasses. When this plate of air, by turning the prisms about their common axis, became so little inclined to the incident rays, that some of them began to be transmitted, there arose in it many slender arcs of colours, which increased, as the motion of the prisms was continued, and bended more and more about the transparent spot, till they were completed into circles, or rings, surrounding it; and afterwards they became continually more and more contracted.

By another experiment with two object-glasses, he was enabled to observe distinctly the order and quality of the colours from the central spot, to a very considerable distance. Next to the pellucid central spot, made by the contact of the glasses, succeeded blue, white, yellow, and red.

The next circuit immediately surrounding these consisted of violet, blue, green, yellow, and red. The third circle of colours was purple, blue, green, yellow, and red. The fourth circle consisted of green and red. All the succeeding colours became more and more imperfect and dilute, till, after three or four revolutions, they ended in perfect whiteness.

In order to determine the thickness of the plate of air, by which he supposed the colours were produced, he measured the diameters of the first six circles, at their most lucid parts, and found their squares to be in the arithmetical progression of the odd numbers 1, 3, 5, 7, 9, 11; and hence he concluded, that the intervals of the glasses at these circles must be in the same progression. He also measured the diameters of the dark or faint rings between the more lucid colours, and found their squares to be in the arithmetical progression of the even numbers 2, 4, 6, 8, 10, 12; and he concluded, after an accurate mensuration, the thickness of the air at the darkest part of the first dark ring, made by perpendicular rays, to be in the nearest round numbers $\frac{3}{16}$ of an inch, half of which, multiplied by the progression 1, 3, 5, 7, 9, 11, &c. gives the thickness of the air at the most luminous parts of all the brightest rings, their arithmetical means being its thickness at the darkest parts of all the dark ones. In examining the under side of the thin plate, in order to observe what light was transmitted, he found that the central spot was white, and the order of the colours was yellowish-red; black, violet, blue, white, yellow, red; violet, blue, green, yellow, red, &c.; but these colours were very faint and dilute, except when the light was transmitted very obliquely through the glasses. When he put water between the glasses, and measured the rings again, he found the proportion of their diameters to the diameters of the like circles made by air, to be about 7 to 8; so that the intervals of the glasses, at similar circles, caused by water and air, were about 3 to 4.

When these rings were examined in a darkened room, by the coloured light of a prism cast on a sheet of white paper, they became more distinct, and visible to a far greater number than in the open air. He sometimes saw more than twenty of them, whereas in the open air he could not discern above eight or nine.

From other curious observations on these rings, made by different kinds of light thrown upon them, he inferred, that the thicknesses of the air between the glasses, where the rings are successively made, by the limits of the seven colours, red, orange, yellow, green, blue, indigo, and violet, in order, are one to another as the cube roots of the squares of the eight lengths of a chord, which sound the notes in an octave, *sol, la, fa, sol, la, mi, fa, sol*; that is, as the cube roots of the squares of the numbers 1, $\frac{5}{4}$, $\frac{9}{4}$, $\frac{7}{4}$, $\frac{3}{2}$, $\frac{5}{3}$, $\frac{7}{6}$, $\frac{1}{2}$. These rings appeared of that prismatic colour with which they were illuminated; and by projecting the prismatic colours immediately upon the glasses, he found that the light, which fell on the dark places between the coloured rings, was transmitted through the glasses without any change of colour. From this circumstance he thought that the origin of these rings is manifest; because the air between the glasses is disposed, according to its various thicknesses, in some places to reflect, and in others to transmit the light of any particular colour, and in the same place to reflect that of one colour, where it transmits that of another.

In examining the phenomena of colours made by a denser medium surrounded by a rarer, such as those which appear in plates of Muscovy glass, bubbles of soap and water, &c. the colours were found to be much more vivid than the others, which were made with a rarer medium surrounded

by a denser. From the preceding phenomena it is an obvious deduction, that the transparent parts of bodies, according to their several sizes, reflect rays of one colour, and transmit those of another; on the same account that thin plates, or bubbles, reflect or transmit those rays; and this Newton supposed to be the reason of all their colours. Hence also he has inferred, that the size of those component parts of natural bodies that affect the light, may be conjectured by their colours. See COLOUR and REFLECTION.

Sir Isaac Newton, pursuing his discoveries concerning the colours of thin substances, found that the same were also produced by plates of a considerable thickness, divisible into lesser thicknesses. The rings formed in both cases have the same origin, with this difference, that those of the thin plates are made by the alternate reflections and transmissions of the rays at the second surface of the plate, after one passage through it; but that, in the case of a glass speculum, concave on one side, and convex on the other, and quicksilver over on the convex side, the rays go through the plate, and return before they are alternately reflected and transmitted. Newton's Optics, p. 169, &c. or Newton's Opera, Horsley's edit. vol. iv. p. 121, &c. p. 184, &c.

The abbé Mazeas, in his experiments on the rings of colours that appear in thin plates, has discovered several important circumstances attending them, which were overlooked by the sagacious Newton, and which tend to invalidate his theory for explaining them. In rubbing the flat side of an object-glass against another piece of flat and smooth glass, he found that they adhered very firmly together after this friction, and that the same colours were exhibited between these plane glasses, which Newton had observed between the convex object-glass of a telescope, and another that was plane; and that the colours were in proportion to their adhesion. When the surfaces of pieces of glass, that are transparent and well polished, are equally pressed, a resistance will be perceived; and wherever this is felt, two or three very fine curve lines will be discovered, some of a pale red, and others of a faint green. If the friction be continued, the red and green lines increase in number at the place of contact; the colours being sometimes mixed without any order, and sometimes disposed in a regular manner; in which case the coloured lines are generally concentric circles, or ovals, more or less elongated, as the surfaces are more or less united. When the colours are formed, the glasses adhere with considerable force; but if the glasses be separated suddenly, the colours will appear immediately upon their being put together, without the least friction. Beginning with the slightest touch, and increasing the pressure by insensible degrees, there first appears an oval plate of a faint red, and in the centre of it a spot of light green, which enlarges by the pressure, and becomes a green oval, with a red spot in the centre; and this enlarging, in its turn, discovers a green spot in its centre. Thus the red and green succeed one another in turns, assuming different shades, and having other colours mixed with them. The greatest difference between these colours exhibited between plane surfaces, and those by curve ones, is, that, in the former case, pressure alone will not produce them, except in the case above-mentioned. In rubbing together two prisms, with very small refracting angles, which were joined so as to form a parallelepiped, the colours appeared with a surprising lustre at the places of contact, and differently coloured ovals appeared. In the centre there was a black spot, bordered by a deep purple; next to this appeared violet, blue, orange, red tinged with purple, light green, and faint purple. The other rings appeared to the naked eye to consist of nothing but faint reds and greens. When

these coloured glasses were suspended over the flame of a candle, the colours disappeared suddenly, though they still adhered; but being suffered to cool, the colours returned to their former places, in the same order as before. At first the abbé Mazeas had no doubt but that these colours were owing to a thin plate of air between the glasses, to which Newton has ascribed them; but the remarkable differences in the circumstances attending those produced by the flat plates, and those produced by the object-glasses of Newton, convinced him that the air was not the cause of this appearance. The colours of the flat plates vanished at the approach of flame, but those of the object-glasses did not. Nor was this difference owing to the plane glasses being less compressed than the convex ones; for though the former were compressed ever so much by a pair of forceps, it did not in the least hinder the effect of the flame. Afterwards he put both the plane glasses and the convex ones into the receiver of an air-pump, suspending the former by a thread, and keeping the latter compressed by two strings; but he observed no change in the colours of either of them, in the most perfect vacuum that he could make. Suspecting still that the air adhered to the surface of the glasses, so as not to be separated from them by the force of the pump, he had recourse to other experiments, which rendered it still more improbable that the air should be the cause of these colours. Having laid the coloured plates, after warming them gradually, on burning coals; and thus, when they were nearly red, rubbing them together, he observed the same coloured circles and ovals as before. When he ceased to press upon them, the colours seemed to vanish; but they returned, as he renewed the friction. In order to determine whether the colours were owing to the thickness of some matter interposed between the glasses, he rubbed them together with suet and other soft substances between them; yet his endeavours to produce the colours had no effect. However, by continuing the friction with some degrees of violence, he observed, that a candle appeared through them encompassed with two or three concentric greens, and with a lively red inclining to yellow, and a green like that of an emerald; and at length the rings assumed the colours of blue, yellow, and violet. The abbé was confirmed in his opinion that there must be some error in Newton's hypothesis, by considering that, according to his measures, the colours of the plates varied with the difference of a millionth part of an inch; whereas he was satisfied that there must have been much greater differences in the distance between his glasses, when the colours remained unchanged. From other experiments he concluded, that the plate of water introduced between the glasses was not the cause of their colours, as Newton apprehended; and that the coloured rings could not be owing to the compression of the glasses. After all he adds, that the theory of light, thus reflected from thin plates, is too delicate a subject to be completely ascertained by a small number of observations. Berlin Mem. for 1752, or Memoirs Prefentes, vol. ii. p. 28—43.

For M. du Tour's experiments and observations, see Mem. Pres. vol. iv. p. 288.

M. Muschenbroeck is also of opinion, that the colours of thin plates do not depend upon the air; but as to the cause he is not satisfied. Introd. ad Phil. Nat. vol. ii. p. 738. See on this subject Priestley's Hist. of Light, &c. per. 6. sect. 5. p. 498, &c.

Sir Isaac Newton's explanation of the appearance of the above-mentioned coloured concentric rings, who accounts for the production of them by ascribing to the rays of light certain fits of easy reflection and easy transmission alternately returning and taking place with each ray at

certain

certain stated intervals, not being satisfactory to Dr. Herschel, he instituted a series of experiments with a view of investigating the cause of these phenomena. Newton's hypothesis appears to him not easily reconcilable with the minuteness and extreme velocity of the particles of which these rays, according to the Newtonian theory, are composed. The detail of this celebrated astronomer's experiments would far exceed our limits; we must therefore content ourselves with referring for an account of them to the *Phil. Trans.* for 1807, vol. xvii. pt. 2. and with merely stating the consequences which he has deduced from them.

It is evident, says our author, that the phenomena of concentric rings must have an adequate cause, either in the very nature or motion of the rays of light, or in the modifications that are given to them by the two essential surfaces that act upon them at the time of the formation of the rings. Hence he infers, that the true cause may be reduced to an alternative that may be determined; for if it can be shewn, that a disposition of the rays of light to be alternately reflected and transmitted cannot account for the phenomena which this hypothesis is to explain, a proposal of accounting for them by modifications that may be proved, even on the principles of sir Isaac Newton, to have an existence, will be readily admitted. Accordingly Dr. Herschel offers some arguments for removing an obstacle to the investigation of the real cause of the formation of the concentric rings; for after the very plausible supposition of the alternate fits, which agrees so wonderfully well with a number of facts that have been related, it will hardly be attempted, if these should be set aside, to ascribe some other inherent property to the rays of light, by which we might account for them: and thus we shall be at liberty to turn our thoughts to a cause, that may be found in the modifications arising from the action of the surfaces, which have been proved to be the only essential ones in the formation of rings. Our author proceeds to observe, that concentric rings cannot be formed by an alternate reflection and transmission of the rays of light; for if we adopt one of the most simple methods of obtaining a set of concentric rings, which is that of laying a convex lens upon a plain metalline mirror, we can in this case have no transmission of rays, nor consequently any alternate reflection and transmission of them. He further observes, that alternate fits of easy reflection and easy transmission, if they exist, do not exert themselves according to the various thicknesses of thin plates of air. In the following experiment, he placed a plain well-polished piece of glass 5.6 inches long, and 2.3 thick, upon a plain metalline mirror of the same length with the glass, and in order to keep the mirror and glass at a distance from each other, he laid between them, at one end, a narrow strip of such paper as is commonly put between prints. The thickness of that which was used in this case was the 640th part of an inch. Upon the glass was put a 39-inch double convex lens; and having exposed this combination to a proper light, two complete sets of coloured rings were visible in this arrangement. The rays which convey the secondary set of rings to the eye must pass through a thin wedge of air, and if these rays are endowed with permanent fits of easy reflection and easy transmission, or absorption, their exertion, according to sir I. Newton, should be repeated at every different thickness of the plate of air, which amounts to the 640th part of an inch, of which he says, "*hæc est crassitudo aeris in primo annulo obscuro radii ad perpendiculum incidentibus exhibitæ, qua parte is annulus obscuro*

riffimus est." The length of the thin wedge of air, reckoned from the line of contact, to the beginning of the interposed strip of paper, is 5.2 inches, from which, by calculation, it will have the above-mentioned thickness at $\frac{1}{64}$ th of an inch from the contact; and therefore at $\frac{1}{32}$ th, $\frac{1}{16}$ th, $\frac{1}{8}$ th, $\frac{1}{4}$ th, &c. we shall have the thicknesses of air between the mirror and glass equal to $\frac{1}{128}$ th, $\frac{1}{64}$ th, $\frac{1}{32}$ th, $\frac{1}{16}$ th, $\frac{1}{8}$ th, &c. of which the same author says that they give "*crassitudines aeris in omnibus annulis lucidis, qua parte illi lucidissimi sunt.*" Hence it follows that, according to the above hypothesis, the rings of the secondary set, which extended over a space of $\frac{1}{14}$ of an inch, should suffer more than seven interruptions of shape and colour in the direction of the wedge of air.

In order to ascertain whether such an effect had any existence, Dr. Herschel viewed the secondary set of rings upon every part of the glass-plate, by moving the convex lens from one end of it gradually to the other; and his attention being particularly directed to the third, fourth, and fifth rings, which were extremely distinct, he saw them retain their shape and colour all the time without the smallest alteration.

The same experiment was repeated with a piece of plate-glass instead of the metalline mirror, in order to give room for the fits of easy transmission, if they existed, to exert themselves, but the result was still the same; and the constancy of the brightness and colours of the rings of the secondary set plainly proved, that the rays of light were not affected by the thickness of the plate of air through which they passed.

Our author next proceeds to shew, that alternate fits of easy reflection and easy transmission, if they exist, do not exert themselves according to the various thicknesses of thin plates of glass. In proof of this he selected a well-polished plate of coach-glass 17 inches long, and about 9 broad. Its thickness at one end was $\frac{1}{32}$ th, and at the other $\frac{1}{16}$ th of an inch; so that in its whole length it differed $\frac{1}{64}$ th of an inch in thickness; and it was regularly tapering from one end to the other. This plate, with a double convex lens of 55 inches laid upon it, being placed upon a small metalline mirror, and properly exposed to the light, exhibited the usual two sets of rings. In the secondary set, which was the object of attention, 12 rings were counted, and the central space between them was estimated to be about $1\frac{1}{2}$ times as broad as the space occupied by the 12 rings on either side; so that the whole space taken up might be reckoned equal to the breadth of 40 rings of a mean size; for the 12 rings, as usual, were gradually contracted in breadth as they receded from the centre, and by a measure of the whole space thus occupied, it was found that the breadth of a ring of a mean size was about the 308th part of an inch.

According to sir I. Newton's calculation of the action of the fits of easy reflection and easy transmission in thick glass-plates, an alternation from a reflecting to a transmitting fit requires a difference of $\frac{1}{32}$ th part of an inch in thickness (*Newton's Optics*, p. 277.); and by calculation this difference took place in the glass-plate, that was used at every 80th part of an inch of its whole length. The 12 rings, as well as the central colour of the secondary set, should consequently have been broken by the exertion of the fits at every 80th part of an inch; and from the space over which these rings extended, which was about $\frac{1}{13}$ inch, it was found, that there must have been more than 10 such interruptions or breaks in a set of which the 308th part was plainly to be distinguished. But when the glass-

plate was drawn gently over the small mirror, keeping the secondary set of rings in view, their shape and colour were found to be always completely formed.

This experiment was also repeated with a small plain glass, instead of the metalline mirror put under the large plate. In this manner it still gave the same result, with no other difference but that only six rings could be distinctly seen in the secondary set, on account of the inferior reflection of the subjacent glass.

Our author next shews, that coloured rings may be completely formed without the assistance of any thin or thick plates, either of glass or of air. Sir I. Newton placed a concave glass mirror at double its focal length from a chart, and observed, that the reflection of a beam of light admitted into a dark room, when thrown upon this mirror, gave "four or five concentric irises or rings of colours like rainbows" (*Optics*, p. 265.); and he accounts for them by alternate fits of easy reflection and easy transmission, exerted in their passage through the glass-plate of the concave mirror. *Ibid.* p. 277.

The duke de Chaulnes concluded from his own experiments of the same phenomena, that these coloured rings depended upon "the first surface of the mirror, and that the second surface, or that which reflects them after they had passed the first, only served to collect them, and throw them upon the pasteboard, in a quantity sufficient to make them visible." (*Priestley's Hist. &c.* p. 515.) Mr. Brougham, after having considered what the two last-mentioned authors had done, says, "that upon the whole there appears reason to believe, that the rings are formed by the first surface out of the light, which, after reflection from the second surface, is scattered, and passes on to the chart." *Phil. Transf.* for 1796, p. 216.

Dr. Herschel's experiment is as follows. He placed a highly polished seven-foot mirror, but of metal instead of glass, that he might not have two surfaces, at the distance of fourteen feet from a white screen, and through a hole in the middle of it, one-tenth of an inch in diameter, he admitted a beam of the sun into his dark room, so directed as to fall perpendicularly on the mirror. In this arrangement the whole screen remained perfectly free from light, because the focus of all the rays, which came to the mirror, was by reflection thrown back into the hole through which they entered. After this preparation, an assistant strewed some hair-powder with a puff into the beam of light, while he kept his attention fixed upon the screen. As soon as the hair-powder reached the beam of light the screen was suddenly covered with the most beautiful arrangement of concentric circles, displaying all the brilliant colours of the rainbow. A great variety in the size of the rings was obtained by making the assistant strew the powder into the beam at a greater distance from the mirror; for the rings contract by an increase of the distance, and dilate on a nearer approach of the powder. This experiment, says our author, is so simple, and points out the general causes of the rings which are here produced in so plain a manner, that we may confidently say, they arise from the flexion of the rays of light on the particles of the floating powder, modified by the curvature of the reflecting surface of the mirror. From this experiment our author concludes, that the principle of thin or thick plates, either of air or glass, on which the rays might alternately exert their fits of easy reflection and easy transmission, must be given up: and that the fits themselves of course cannot be shewn to have any existence: It will hardly be necessary to add further, that the whole theory relating to the size of the parts of natural

bodies and their interstices, which Sir I. Newton has founded upon the existence of fits of easy reflection and easy transmission, exerted differently, according to the different thicknesses of the thin plates of which he supposes the parts of natural bodies to consist, will remain unsupported; for if these fits have no existence, the whole foundation on which the theory of the size of such parts is placed, will be taken away, and it will be necessary to explore another basis for a similar edifice. This basis, our author conceives, is to be found in the modifying power, which the two surfaces that have been proved to be essential to the formation of rings, exert upon the rays of light.

Our author having pointed out a variety of methods that serve to produce coloured concentric rings between two glasses of a proper figure applied to each other, and having proved that only two surfaces, namely, those that are in contact with each other, are essential to their formation, proceeds in the investigation of the subject to shew, that prismatic phenomena assume the shape of rings, in consequence of the sole use of spherical curves in producing them. Our author found, by an appropriate experiment, that, as spherical curves gave circular rings, cylindrical forms produce streaks; that cylindrical and spherical surfaces combined produce coloured elliptical rings; and that irregular curves produce irregular figures. Hence he infers, that the curvature of surfaces is the cause of the appearance, as well as of the shape of the coloured phenomena which are produced. If we can invariably predict, from the nature of the curves that are employed in an experiment, what will be the appearance and form of the colours that will be seen, it certainly must prove the efficacy of these curvatures in the production of such phenomena. This conclusion is further confirmed by the consideration, that coloured appearances cannot be produced between the plain surfaces of two parallel pieces of glass applied to one another.

Having proved that no more than two surfaces are essential to the formation of Newton's coloured rings, and that the configuration of the coloured phenomena arises from the curvature of one or both of the two essential surfaces, Dr. Herschel infers from these principles, that we are to distinguish between the production of the colours and that of their configuration when produced. The cause of the configuration has been already explained; and our author next proceeds to investigate the production and arrangement of the colours. The order of the colours is prismatic; that is, red, orange, yellow, green, blue, indigo, and violet. Dr. Herschel's experiments for ascertaining this arrangement are too numerous and various to be here recited. We shall therefore state the general proposition, and specify the results of the experiments by which it is established. The general proposition is, that the critical separation of the colours, which takes place at certain angles of incidence, is the primary cause of the Newtonian coloured rings between optic glasses. The results of the experiments are as follow: these experiments (for which we refer to *Phil. Transf.* for 1809, vol. xcix. pt. 2.) explain in what manner a critical separation of the colours, which takes place at certain angles of incidence, is the cause of the appearance of the blue and red bows; since the different reflexibility of the rays of light, by which Newton has accounted for the blue bow, brings on a critical separation of the blue colours, and since also the different intromissibility by which the author has explained the red bow, occasions an equally critical separation of the red ones. Dr. Herschel has not only proved that all the various appearances, which were produced by convex glasses, may be

equally

equally well obtained by the use of a prism, but he has also shewn, that the great simplicity of this valuable optical instrument has cleared up great difficulties, by pointing out to us that the colours which are modified into such various shapes, are in all prismatic experiments exclusively produced by the critical separation of the rays of light. As this fact must be admitted, it certainly will not be philosophical to look for a different cause of the same or similar effects, when convex glasses, which have all the required prismatic properties, are used to produce them. In order to shew the great similarity, or rather the identity of these effects, it will be sufficient to take the most simple case of each, namely, the coloured rings that are produced when a plano-convex lens is laid with its convex side upon a plain reflecting surface: and the coloured streaks which are produced when the base of a right-angled prism is in the same manner placed upon such a surface. The results of the experiments, with the reasonings annexed to them, are contained in the following propositions. The form of rings arises from the spherical figure of the lens: the right-lined appearance of the streaks is owing to the straight figure of the plain surface of the prism. The colour of the rings may suddenly be changed; the colours of the blue bow-streak may as instantly be converted into those of the red bow. The cause of the sudden change of the rings has been shewn to be that the sets of one colour are seen by reflection, and those of the other by transmission; it has also been shewn, that the blue bow-streaks are seen by reflection, and those of the red bow by transmission. In a lens we may, at the same time, see, in half the set, the colours of the reflected, and in the other half, the colours of the transmitted rings; and in a prism held before an open window, when the eye is close to it, and when half the bow falls on the side of the room, we may see blue streaks by reflection from half the blue bow, and green streaks by transmission from half the red bow. When deep convex, or concave, glasses are laid upon the first surface of a lens, the rings are not affected by it; and when the same glasses are laid upon the first surface of a prism the streaks remain unaltered. When the convexity of the lens, which is placed on the reflecting surface, is changed, the size of the rings is also changed; and when the angle of the prism is increased or diminished, the distance of the streaks undergoes a proportional alteration. When the lens is pressed upon the plain glass, the rings increase in diameter; and by a pressure of the plain glass against the prism the distance of the streaks grows larger. To form rings by a lens, scattered rays only are required: and the same light is best for the production of streaks by a prism. Many other instances of similarity might be adduced, but it is needless. Now, as it has been clearly proved, that the critical separation of the colours, which takes place at certain angles of incidence, occasions all the phenomena of the blue and red bows, and of the streaks, rings, and other regular or irregular appearances, that may be seen in a prism, it cannot be doubted that the Newtonian rings observed between object-glasses are owing to the same cause.

Dr. Herschel concludes an elaborate paper on this subject with the following remarks on the Newtonian alternate fits of easy reflection and easy transmission.

“In attempting to rescue the science of optics from what has been so long considered as unsatisfactory for explaining the great question about the cause of the coloured rings, I have made use of a principle, the effects of which have so near a resemblance to those of the supposititious fits of easy reflection and easy transmission, that the author of them might easily be misled by appearances. But although the principle of a critical separation of the colours, substituted for these fits, admits the reflection of some rays at the same angles of

incidence at which others are transmitted, yet since the Newtonian different refrangibility of light will account for these critical reflections within glass, and equally critical intromissions from without, we can have no longer any reason to ascribe original fits to the rays of light, which in the first part of this paper they have already been proved not to possess, and which now, in all prismatic experiments, I have shewn are not necessary for explaining appearances that may be accounted for without them.”

In the *Philos. Transactions* for 1810, vol. c. pt. 2, we have a third paper, as a supplement to the other two papers, containing additional observations on the cause of coloured concentric rings between object-glasses, and other appearances of a similar nature, in which Dr. Herschel further explains what some may have thought obscure, and obviates certain objections against his theory. His fundamental principle for explaining the colour of the rings, which he has illustrated both by reasoning and experiment, is this: that the colours in all prismatic phenomena are produced either by the interior critical separation arising from the different reflexibility of the rays which cause the blue bow, or by the exterior critical separation arising from the different intromissibility of the rays which cause the red bow. In this paper he subjoins some additional arguments to those before given, in order to prove, that there are two primary prismatic bows, a blue one and a red one; and he maintains, that the red bow is a phenomenon of equal originality with the Newtonian blue bow, and that as one of these bows cannot be the converse of the other, we have two critical separations essentially different, *viz.* the reflective and intromissive. But we must refer to the author's own account, *ubi supra*.

For an account of the rings of colours produced by electrical explosions, see *COLOURS of Natural Bodies*, *CIRCULAR Spots*, and *FAIRY Circles*.

RINGS of Flies, in *Natural History*, the several rounds or circular portions, of which the bodies of these and other insects are composed.

In the fly kind these are crustaceous or cartilaginous, and consequently of a matter little capable of extension; many actions of these insects require, however, that their bodies, or a part at least of their bodies, should be able to inflate or distend, and contract their size occasionally. Were every ring of the body one entire scale, or shelly substance, these changes could not be easily effected; nature has therefore so provided, that the tender bodies of these little creatures are sufficiently defended, and yet all the necessary motions may be performed.

RING, in *Agriculture*, a sort of hoop made of iron, which is used for various purposes, as fastening horses and cattle by in the stalls. In these cases they should be made large and strong.

RING, in *Commerce*, a term used in reckoning at Hamburg, and is equivalent to 240 of things that are sold by number. Staves are sold in rings of 4 choaks (a choak being 60) and 8 pieces: 3 rings of hoghead staves, or 6 rings of barrel staves, are reckoned equal to 2 rings of pipe staves.

RING, a stout circle of iron in the upper part of the shank of an anchor, to which the cable is bent.

RINGS are also circles of iron or other metal, let over the points of bolts, whereon they are clenched, to prevent their drawing. Hatch-rings, or ring and staves, are those which are fixed in the hatches or scuttles to open or shut them with.

RINGS in Timber, in *Rural Economy*, the concentric layers by which the wood is formed. These rings are, according to Dr. Darwin, annually produced from the albumen, and

are supposed to be thicker on that side of the trunk of the tree which has a southern aspect than on the contrary, and thicker in those summers most favourable to vegetation than in others. It is added, that these rings, as they lose their vegetable life, and at the same time a part of their moisture, by evaporation or absorption, gradually become harder, and of a darker colour, inasmuch, that by counting their number, it is said, that not only the age of the tree, but the mildness or moisture of each summer, during the time of its growth, may be estimated by the respective thickness of the rings of timber.

RING, *Base*. See BASE.

RING-Bolt, in a *Ship*, is an iron bolt with an eye at one end, in which is fitted a circular ring, and used for various purposes; particularly for hooking the tackles, by which the cannon of a ship is managed and secured. They are driven by the sides of the gun-ports in ships for securing the guns; and in the deck for stopping the cable, and are therefore called stopper-bolts. The rings are sometimes made angular, to receive many turns of lashing; such are the ring-bolts driven through the ship's side along the waist for lashing the booms and spare anchors.

RING-Bone, among *Farriers*, &c. a hard callous substance, growing in the hollow circle of the little pattern of a horse, above the coronet.

It sometimes goes quite round, like a ring, whence its name; sometimes it is hereditary, derived from the stallion or mare; but it oftener comes by accident, as from a strain, a blow of a horse, &c.

RING, *Corniche*. See CORNICHE.

RING-Dial. See DIAL.

RING-Dove. See DOVE, and COLUMBA *Palumbus*.

RING, *Fairy*. See FAIRY.

RING-Head, an engine used in stretching of cloth.

RING, *Natal*. See NATAL.

RING Ouzel or *Amsel*. See OUZEL, and TURDUS *torquatus*.

RING, *Reinforce*. See REINFORCE.

RING-Ropes, in a *Ship*, short pieces of rope, tied occasionally to the ring-bolts of the deck, to fasten the cable more securely, when the ship rides in a tempest, or turbulent sea, or rapid current. They are used more particularly in veering away the cable gradually in those circumstances, in order to freshen the haul.

RING-Scalpel. We have a description and a figure of a ring-scalpel, for assisting the delivery of women in childbirth, by Dr. Thomas Simson, in the *Medical Essays of Edinburgh*, vol. v. art. 39.

RING-Tail, in *Ornithology*, the English name for the *subbuteo*, or *pygargus accipiter*; which has been generally supposed to be the female of the hen-harrier; but males have lately been found of this species. See FALCO *Pygargus*.

The ring-tail is a moderately large bird. It has a sort of ring, or chain of feathers, round the back part of its head, reaching to its chin on each side, which stand erect, and are brown in the middle, and of a reddish-white at the edges, and make a sort of crown, which surrounds the head; on the top of the head and cheeks the feathers are dusky, bordered with rust-colour; under each eye is a white spot; the back is dusky, the rump white, with oblong yellowish spots on each shaft; the tail is long, and its tip white; the breast and belly are of a yellowish-brown, marked with oblong dusky spots; its legs are yellow, and the inside of its mouth is black; it feeds on small birds, and its eggs are of a reddish hue, with very little clear white appearing in them. These birds fly higher than the hen-harrier, and sometimes perch on trees.

RING-Tail Eagle. See *White-tailed EAGLE*, and FALCO *Albicilla*.

RING-Tail, in a *Ship*, is a quadrilateral sail, occasionally hoisted abaft the after-leech of the boom-mainsails, to which the fore-leech is made to correspond. The head is bent to a small yard at the outer end of the gaff, and the foot is spread on the boom, which is prolonged by a piece lashed to the outer end. A triangular sail of this sort is used in light favourable winds, extended on a small mast, occasionally erected for that purpose on the taffarel of small vessels.

RING, *Trunnion*. See TRUNNION.

RING-Walk, among *Hunters*, a round walk. See HUNTING.

RING-Worm, in *Medicine*. See RINGWORM.

RING Island, in *Geography*, a small island off the coast of Massachusetts, opposite to Newbury port, to the eastward.

RINGAN, a town of Germany, in the principality of Culmbach; 14 miles S. of Culmbach.

RINGANDEE, a town of Bengal; 30 miles W. of Ragonatpour.

RINGELBERGIUS, JOACHIM-FORTIUS, in *Biography*, vernacularly Sterck, an eminent Flemish philosopher and mathematician, who flourished in the 16th century, was born at Antwerp. He was patronized by the emperor Maximilian I., in whose palace he had an apartment, and he there received his first instructions in the rudiments of learning. When he was seventeen years of age, he was sent to the university of Louvain, where he studied the learned languages, philosophy, and the mathematical sciences. He became a public professor in that university, and taught rhetoric, cosmography, the mathematics, and the Greek language, with very high reputation. So numerous were the classes which attended his lectures, that they frequently occupied his attention twelve hours every day, for a month together. In the year 1528 he went into Germany, and taught the mathematical sciences and the Greek tongue in various seminaries of that country. From Germany he went to France, where he filled the professor's chair at Paris, Orleans, Bourdeaux, and other places. He died about the year 1536. He wrote a number of esteemed works, which were published at Basil, Antwerp, and other places, and reflected honour on his learning and judgment. The titles of some of them are, "De Ratione Studii;" "De Usu et Differentiis vocum quarundam apud Latinos;" "De Usu Vocum quæ non sectantur;" "Grammaticæ Græcæ Elementa;" "Dialectica, et Tabulæ Dialecticæ;" "De conferendis Epistolis Lib.;" "Rhetoricæ, et quæ ad eam spectant;" "Sententiæ;" "De Formis dicendi, Lib.;" "De Periodis;" "Synonyma;" "Sphæra, sive Institutionum Astronomicarum, Lib. iii.;" "Cosmographia;" "Optica;" "Chaos Mathematicum;" "Arithmetica." The whole of his works were collected and published at Leyden, in 1531.

RINGELSLOFF, in *Geography*, a town of Austria; 4 miles E.N.E. of Zisterdorf.

RINGEN, a town of Russia, in the government of Riga; the birth-place of the empress Catharine I., near Dorpat.

RINGENDORF, a town of France, in the department of the Lower Rhine; 7 miles W. of Haguenau.

RINGENT COROLLA, in *Botany* and *Vegetable Physiology*, named from its resemblance to the mouth and snout of some animal; see COROLLA. Certain English authors, literally translating the original word (*ringens*), use the ludicrous term of a *grinning corolla*.

RINGENTHAL, in *Geography*, a town of Saxony, in the circle of Erzgebirg; 1 mile N. of Mitweyda.

RINGERIKE, a town of Norway; 24 miles N.N.E. of Christiania.

RINGES, in *Rural Economy*, a provincial term, signifying rows of hay, mown corn, quicks, &c.

RINGKIOBING, in *Geography*, a town of Denmark, on the coast of a large gulf of the North sea, to which it gives name. The inhabitants are almost wholly employed in trading to Holland and Norway. The bay affords plenty of good fish, particularly oysters. It is of a good depth, and secure, except at the entrance, which is rendered dangerous by sand-banks; 48 miles N.W. of Ripen. N. lat. $56^{\circ} 2'$. W. long. $8^{\circ} 18'$.

RINGLEBEN, a town of Saxony, in the principality of Eifenach; 6 miles N. of Erfurt. N. lat. $51^{\circ} 6'$. E. long. $11^{\circ} 2'$.

RINGO'S TOWN, a town of America, in Hunterden county, New Jersey; 15 miles N.W. of Princeton.

RINGSTED, a town of Denmark, in the island of Zealand, anciently a large city, but reduced by fires into a small town: but it is still famous for its court of judicature, to which lies an appeal from almost all the courts of Zealand, whereas no appeal lies from this but to the supreme court at Copenhagen; 29 miles S.W. of Copenhagen. N. lat. $55^{\circ} 28'$. E. long. $11^{\circ} 48'$.

RINGWOOD, a town of America, in Hunterden county; 25 miles N. of Morrifstown, containing 2605 inhabitants.

RINGWOOD, a market-town and parish in the hundred of Ringwood, New Forest, west division, county of Southampton, England, is situated on the eastern bank of the river Avon, at the distance of 14 miles W. by S. from Southampton, and 90 miles S.W. by W. from London. This town is of great antiquity, and is supposed by Camden to have been the Regnum of the Romans, which others, however, have fixed, with greater probability, at Chichester, in Suffex. But whatever it may have been during the Roman government, it unquestionably attained considerable importance in the time of the Saxons; and in Domesday book, it is estimated at a higher value than Thuinam, or Christchurch.

Ringwood is noted for its breweries of strong beer and ale. A market is held here on Wednesday, weekly; and there are fairs on the 10th of July, and 11th of December. The petty sessions for New Forest, west division, are holden in this town. The unfortunate duke of Monmouth is very generally stated to have been taken in a field near Ringwood, after his defeat at Sedgemoor; but this statement is erroneous, that prince having been actually seized in the woodlands in Dorsetshire. According to the parliamentary returns of 1811, the town and parish contained 658 houses, and a population of 3269 persons.

North from Ringwood is the village of Ellingham, where formerly was a religious house, founded by William de Salariis, in the reign of Henry II., and appropriated as a cell to the abbey of St. Saviour le Vicompte, in Normandy. When the alien priories in this country were dissolved, Henry VI. granted Ellingham and its possessions to the college at Eton. Some remains of the buildings of this establishment are supposed to form the nave of the present church, and the opinion is certainly not improbable, as it is more ancient than the rest of the fabric. The altar-piece here is a painting of the Day of Judgment, presented to the parish by the late lord Windsor, whose ancestor, brigadier Windsor, brought it from Port St. Mary, in the bay of Cadiz, among the trophies of an expedition against that city in the year 1702.

In the church-yard is a plain stone, to the memory of dame Alicia Lisle, whom the blood-thirsty Jeffreys condemned to be executed in her old age, on a charge of harbouring known rebels in her mansion at Moyles-Court. This mansion is still standing, surrounded by a very pleasant, but small, park. Its former possessors, the Lisles, were originally settled in the Isle of Wight, where they had large estates, and whence they derived their name. Colonel John Lisle, husband to the above-mentioned Alicia, was one of the judges who passed sentence on king Charles I. and also one of the lords commissioners of the great seal during the protectorate of Cromwell. On the eve of the restoration he fled to the continent, was proscribed by the parliament of Charles II., and assassinated at Laufanne, in Switzerland, by three villains, hired for that purpose by some of the royal family, or their friends. Beauties of England and Wales, vol. vi. by John Britton, F.S.A. and E. W. Brayley, Lond. 1805.

RINGWORM, in *Medicine*, a popular appellation, applied to various superficial affections of the skin, which assume somewhat of a circular form. But the fact is, that almost all the partial cutaneous diseases have more or less a tendency to the annular figure, and rise in somewhat irregular patches, approximating to the oval or the circle, which is sometimes perfect, and sometimes broken. It is only by referring to an intelligible nomenclature, such as that proposed by the late Dr. Willan, that any discrimination can be clearly made in the varieties of these eruptions. If we examine these ringworms according to this system, we shall find, that there are several diseases, to which the term is applicable, and daily applied, and consequently the same remedies recommended for their cure, which are, nevertheless, very different in their nature, and therefore require very different modes of treatment. Thus there is a circular eruption, which consists of patches of *pimples*, the lichen circumscrip-tus of Dr. Willan; even the *scaly* lepra occurs in circles of various sizes, and is sometimes called ringworm: the *pustular* disease, called *impetigo figurata*, or moist tetter, and the *vesicular* eruption termed herpes circinatus, (see Dr. Bateman's Pract. Synops. of Cutan. Diseases), are also distinguished by their circular form, and it is to these two last that the term *ringworm* is most popularly applied. And above all, the contagious disease of the scalp, the *porrigo scutulata*, is so distinctly circular in its form, as to be distinguished from the other species of the same disorder, by the appellation of *ringworm*, or by some the *ringworm of the scalp*. See the same Synopsis, ord. v. gen. 2. See also **PORRIGO**, **LICHEN**, **HERPES**, &c. above.

The general treatment recommended for ringworms by the vulgar, is the application of common *ink*; and this, by its astringency, which is slight, may be partially useful in the decline of the *herpetic* ringworm, above-mentioned, or in the mildest forms of that of the scalp: but it will be certainly injurious if applied to the moist *tetter*, or to the *lichen* in its early stage; and the same effect can be produced by similar astringents, in a more manageable and less dirty form; as by solutions of the sulphate of iron or zinc in rose-water or other distilled water. But in fact, the ringworm of the scalp requires much more active remedies, on the one hand; and on the other, the herpetic ringworm disappears in a short time spontaneously; so that the remedy may be deemed in both cases useless. It is obvious, then, that diseases, which are pustular, scaly, vesicular, and papular respectively; some of which are inflamed, and others not; some contagious, and others not; some disappearing spontaneously, and others resisting the most active applications; some connected with disorder of the constitution, and

others

others merely local, cannot be treated with advantage, or even with impunity, by the same set of medicines, and ought not to be confounded under the same appellation; but popularly, the name of a disease is alone inquired for, and the remedy is appropriated to the name. By discarding the term ringworm, or uniting with it the epithets pustular, vesicular, or herpetic, porriginous, &c. this practical error may be avoided.

RINLING, or **AINLING**, in *Geography*, a town of Bavaria; 8 miles N.N.W. of Aicha.

RINNE, a river of Thuringia, which runs into the Saale, two miles below Rudelsttadt.

RINOREA, in *Botany*, a name of uncertain derivation, but probably bestowed on this genus by Aublet, from its native appellation in Guiana.—Aubl. Guian. 235. Juss. 287. Lamarck Dict. v. 6. 211. Illustr. t. 134.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Berberides*, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, villous, cloven into five, oblong, acute segments. Cor. Petals ten, concave, ovate, oblong; the five inner ones smaller; all inserted below the germen. Stam. Filaments five, short, inserted at the base of the outer petals; anthers oblong, two-celled, with two valves bursting from the base to the top. Pist. Germen superior, roundish, villous; style oblong, villous; stigma obtuse. Peric. unknown.

Obs. Jussieu describes *Rinorea* as having five longer petals, each furnished with an inner one at its claw or base.

Ess. Ch. Calyx five-cleft. Petals ten, the five inner ones smaller. Style one. Stigma one.

1. *R. guianensis*. Aubl. Guian. t. 93.—Native of cultivated ground in Guiana, where it flowered in January.—A tree six or seven feet high, whose trunk is branched very thickly, to the very summit, in a straight alternate manner. Leaves alternate, stalked, ovate-oblong, acute, toothed. Stipules short, deciduous. Flowers white, in axillary, terminal clusters, each placed on a short stalk, which is furnished with two scales at its base.

RINTELN, in *Geography*, a town of Germany, in the county of Schauenburg, situated on the S. side of the Weser. The university of Stadhagen was removed to this town in the year 1621; its professors of divinity are Lutheran, but those of the other faculties are Calvinists. The town church belongs to the Lutherans; the Calvinists and garrisons use the university church for their service. The ramparts, ditches, and bulwarks, that environ the town, were begun in 1665, and finished in 1668. The inhabitants are chiefly employed in agriculture, breeding of cattle, and brewing; 9 miles S.S.E. of Minden. N. lat. 52° 11'. E. long. 9° 8'.

RINUCCINI, **OTTAVIO**, in *Biography*, an Italian poet of Florence, who went into France in the suite of Mary of Medicis, queen to Henry IV. He was the inventor of the musical drama or opera, that is, of the manner of writing or representing comedies or tragedies in music, to which the first recitative was applied. (See RECITATIVE.) Others give this invention to a Roman gentleman of the name of Emilio del Cavaliere, who was more properly the inventor of the sacred drama or oratorio, in a similar species of music or recitative, so nearly at the same time, that it is difficult to determine which was first: both had their beginning in 1600. See CAVALIERE, and ORATORIO.

It is certain that Rinuccini was author of three lyric pieces, "Daphne," "Euridice," and "Ariadne," which all Italy applauded. Euridice, written for the nuptials of Mary of Medicis, was first performed with great splendour

and magnificence at Florence, at the court and expence of the grand duke.

The poetry of Rinuccini is truly lyrical, smooth, polished, and mellifluous. He died in 1621, at Florence; and his works were published in 1622, in the same city, in 4to. by his son, Pietro Francesco Rinuccini. The family is noble, and was subsisting in 1770.

RINVEEL POINT, in *Geography*, a cape of Ireland, in the county of Galway, N. of Ballinakiel bay. N. lat. 53° 41'. E. long. 9° 58'.

RINUM, a town of Persia, in the province of Segestan or Seistan; 60 miles E.N.E. of Zareng.

RIO de los Anzuolos, a river of Mexico, which runs into the Spanish Main, N. lat. 11° 10'.—**R. dos Apolos**, a river of North America, which runs into the northern part of the gulf of California.—**R. de Bogota**, a river of New Granada, which collects all the waters of the valley of Bogota, the bottom of which valley, according to Humboldt, is no less than 7460 feet above the level of the sea, and finds its way through the mountains to the S.W. of the town of Santa Fé. (See BOGOTA.) The perfect level of the plain, its geological structure, and the form of the rocks, which resemble small islands in the middle of the Savannahs, appeared to M. Humboldt to indicate the existence of an ancient lake. If the single outlet of the river were to be stopped, the valley would again be converted into a lake. The river, where it leaves the valley, is about 144 feet wide, half the breadth nearly of the Seine at Paris, between the Louvre and the Palace of the Arts. It then enters into a narrow rocky channel, not more than 40 feet wide, which appears, says the same intelligent and instructive traveller, to have been formed by an earthquake. After running for a little way in this crevice, the river precipitates itself, at two bounds, to the depth of 574 feet. After this tremendous fall, it pursues its way to the Magdalena, about 50 miles, still descending with great rapidity, and at the rate of 150 feet to a mile. Although this is not the greatest fall in the globe, there is not probably any which, from so great a height, precipitates so large a body of water. Bouguer makes the height between 1500 and 2000 feet; but he speaks only from the information of others who had seen the fall, and pointed out to him such heights as they thought might be nearly equal to it. The accompaniments of this waterfall, upon which the effect so much depends, are an assemblage of every thing that is sublime, beautiful, and picturesque. Independent, says M. Humboldt, of the height and the size of the column of water, the figure of the landscape, and the aspect of the rocks; the peculiar character stamped on these great scenes of nature is owing to the luxuriant form of the trees and herbaceous plants, their distribution into groups, or into scattered thickets, the extent of the craggy precipice, and the freshness of vegetation. Another feature in the character of this extraordinary cataract is probably quite peculiar to it:—the water descends from a cold region to a warm one. The plain of Bogota, especially near the fall, is extremely fertile, and is supposed to owe some of its fruitfulness to the irrigation occasioned by the great quantity of water from the fall, which is dissolved in the air, and afterwards precipitated. The fine crops of wheat, the oak, the elm, and other plants, recall to mind the vegetation of Europe. Looking down from this terrace, one sees, with surprise, at the bottom, a country producing the palm, the banana, and the sugar-cane. This cannot arise from the difference of height; as it is known, that no very great change of temperature can be produced by a difference of level of 570 feet. M. Humboldt suggests, that it is probably owing to the shelter which

which the high country affords to the low. It is one of the circumstances that has added much to the marvellous height of the cataract; as the height is naturally supposed to be great, that carries one at once from the temperature of Europe, and one where the thermometer is sometimes at the freezing point, to that of the torrid zone. Although the river loses a great part of its water in falling, which is reduced into vapour, the rapidity of the lower current forces the observer to keep at the distance of 150 yards from the basin dug out by the fall. The solitude of the place, the richness of the vegetation, and the dreadful roar that strikes the ear, contribute to render the foot of the cataract of Tequendama one of the wildest scenes that can be found in the Cordilleras. (Humboldt's Researches, &c. translated by Helm M^cWilliams, Lond. 1814.)—R. *Bueno*, a river of the island of Jamaica, which runs into the sea on the north coast, N. lat. 18° 30'. W. long. 77° 19'.—R. *de Cedros*, a river of South America, which runs into the Pacific ocean, N. lat. 2° 30'.—R. *Cobre*, a river of Jamaica, which passes by Spanish Town, and runs into the sea, 4 miles N.W. of Kingston.—R. *del Conchos*, or *de Salinas*, a river of Mexico, which joins the Brava at its mouth.—R. *Dolce*, or *Fresh-water river*, a river of Brazil, which runs into the Atlantic, S. lat. 19° 20'.—R. *Dolce*, or *Dulce*, a river of South America, in the province of Tucuman, formed by the confluence of several rivers. After passing by St. Yago del Estero, &c. and pursuing a course of about 300 miles, it loses itself in a salt lake, S. lat. 30° 40'.—R. *de los Deraces*, a river of Mexico, which runs into the Spanish Main, N. lat. 9° 45'.—R. *dos Esmeraldas*, a river of America, on the isthmus of Darien, which runs into the Pacific ocean, N. lat. 2° 42'.—R. *dos Esmeraldas*, a river of Peru, which runs into the Pacific ocean, N. lat. 0° 57'.—R. *Frisco*, a river of Africa, which runs from the Ivory coast into the Atlantic, N. lat. 5° 8'. W. long. 5° 55'.—R. *dos Galinas*. See MAGUALRANI.—R. *Grande*, a river of South America, which runs into the Spanish Main, between Carthagena and St. Martha.—Also, a river of the island of Jamaica, which runs into the sea, on the N. coast, N. lat. 18° 15'. W. long. 76° 14'.—R. *Grande*, or *Ciudad Nova*, a town of Brasil, in the jurisdiction of Fernambuco, formerly the seat of a jurisdiction. S. lat. 5° 44'.—R. *Grande*, a river of Brasil, scarcely deserving the name, the mouth of which is situated in S. lat. 3° 2'.—Also, a river of Africa, which passes the coast of Zanguebar, and runs into the Indian sea, forming the islands of Patta and Lamo at its mouth. S. lat. 2° 5'. E. long. 41° 30'.—Also, a river of Africa, navigable for boats near 400 miles from the mouth, which lies on the Atlantic, N. lat. 11°. W. long. 14° 36'.—Also, a river of America, which rises in the isthmus of Darien, and runs into the Pacific ocean, three miles W. of Panama. See also VERMEJO, PATIXA, and HACHA.—R. *Hondo*, a river of Yucatan, which runs into the bay of Honduras.

Rio de Janeiro, a jurisdiction or independent government of Brasil, so called by the Portuguese when they became masters of the country, from the river Janeiro, which runs through the middle of it; and the river probably derived its name from its having been discovered on the day of the feast of St. Januarius, or on the 1st day of January, in 1516, by Solis. The province and the river are called by the natives "Genabara." At the mouth of the river, on the east side, is the fort of Santa Cruz, and on the west, that of St. Jago, together with the capital. The rivers in this government are few, and none of them large, except the Janeiro, which is rather a salt bay or gulf than a river, and two rivers that discharge themselves into this bay. At the mouth of it are several small islands, that render its entrance

fomewhat difficult and dangerous. Although the soil of this province is for the greatest part rich and fertile, the inhabitants manifest little industry either in the cultivation of the soil or the improvement of the country. It consists chiefly, at least near the capital, in raising garden vegetables for the whites, and rice and manioc for the blacks. Wheat is found to grow in other parts of the Brasils, with an increase beyond what is known in Europe. A corn-mill, distinguished by the simplicity of its structure, attracted the notice of sir George Staunton; and he has thought it worthy of being described. A wheel, a few feet only in diameter, was placed horizontally, much below the current of a stream, as it fell from a steep bank, and was received in hollows, 10 or 12 in number, so obliquely scolloped into the upper rim of the wheel, as to impel it to a quick rotatory motion, while its upright shaft, passing through an opening in the centre of an immoveable mill-stone above the wheel, but of a narrower diameter, was fixed to a smaller mill-stone, which, forced round with the motion of the wheel and dependent shaft, crushed between it and the larger stone beneath, the grain insinuated between them from a hopper. Thus that effect was produced by one wheel only, which is generally the result of a much more expensive and complicated machinery. A similar mill, it is said, is in use in the Crimea. A forest, not far from the capital, was found, by sir George and his associates, to abound in palms and mastic wood; also mango and gouyava trees are found growing to the size of trees, besides many other vegetables, never observed before by those who were then travelling through it. The ipecacuanha plant is said to grow at St. Catharine's within the government of Rio. The size and vivid hue of many of the flowers throughout the forest, and the gaudy plumage of the birds, which came occasionally in sight, were very striking. The woods, it is said, abound in snakes, some of which are extremely large and formidable. But their hissing noise puts those who hear it on their guard, and they seldom, without provocation, advance to an attack. The forest now mentioned led to the cultivated valley of "Tijouca," situated, as it were, in the bottom of a funnel, being surrounded on all sides by mountains, excepting to the southward, where a small opening admitted an arm of the sea. The valley was watered by a clear stream, which, upon first entering it, was precipitated down a steep and broad rock of granite, forming a magnificent cascade. Very little labour appeared necessary in the plantations of Tijouca. Indigo, manioc, coffee, cacao, and chocolate-trees, sugar-canes, plantains, and orange and lime trees, were commonly seen all growing promiscuously, and some spontaneously, in the space of 20 square yards. Coffee and indigo were the principal objects of attention. The temperature of the valley was excessively hot, on account of its confined situation, and the reflection of the sun's rays from the sides of the mountains, which in many places were very rocky. Fahrenheit's thermometer, about four in the afternoon, stood, in the shade, at 83°. Several districts of the government of Rio produced cotton, sugar, coffee, and cacao or chocolate, rice, pepper, and tobacco, in great abundance. That of Rio Grandé yielded plenty of excellent wheat. The vine grew in great perfection; but the grape is not suffered to be pressed for wine, as such a process might interfere with the sale of the same article from Portugal. But probably less caution may be exercised in this respect since the removal of the Portuguese government to the Brasils. Most of the land, as far as Cook and his companions had an opportunity of observing it, was laid down in grass, upon which cattle were pastured in great plenty; but they were so lean, that an Englishman would

scarcely eat their flesh: the herbage of these pastures consists chiefly of cresses, and consequently is so short, that though it may afford a bite for horses and sheep, it can hardly be grazed by horned cattle in a sufficient quantity for keeping them alive. For other particulars relating to the climate, productions, commerce, and inhabitants of this province, see *BRASIL*, and the next article.

Rio de Janeiro, a city of Brazil, and capital of the above-mentioned government, and also of the whole country, and the Portuguese dominions in America, situated on a river, or rather an arm of the sea, of the same name. Formerly *Bahia dos Todos*, or *Santos*, was the principal seat of government, and chief mart for commerce in the *Brasil*s; but the discovery and improvement of the gold and diamond mines, within about 100 leagues of *Rio de Janeiro*, and communicating immediately with it, gave a decided preponderancy to the latter. The city stands on a plain, close to the shore, on the W. side of the bay, at the foot of several high mountains which rise behind it. It is neither ill-designed nor ill-built; the houses in general are of stone, and two stories high; every house having, after the manner of the Portuguese, a little balcony before its windows, and a lattice of wood before the balcony. Its circuit was computed by lieutenant, afterwards captain, Cook, to be about three miles, and it appeared to be equal in size to the largest country towns of England, Bristol and Liverpool not excepted; the streets are straight, and conveniently broad, intersecting each other at right angles; most of them, however, lie in a line with the citadel, called *St. Sebastian*, which stands on the top of a hill, that commands the town. The harbour is safe and capacious, and very convenient for commerce. Captain Mackintosh, from experience, recommends to ships bound for this harbour, after getting in with *cape Frio*, instead of steering along shore, to shape their course between S.W. and S.W. by W. for 12 or 14 leagues. To this distance the land wind extends. The forenoons in general are calm, but almost every afternoon a fresh sea-breeze sets in from the S.W. It is proper to steer, in a direct course, from hence to the small islands lying under the great inclining *Sugar-loaf* on the western side of the entrance into *Rio* harbour. From these small islands the wind will carry the ship to the opposite side of the harbour's mouth, where the fort of *Santa Cruz* is situated, and which may be approached within 50 yards, and from thence, safely and quickly, into harbour. The entrance of the harbour, as sir *Erasmus Gower* observes, will shew itself by discovering the castle or fort of *Santa Cruz*, and a small fortified island, called *Fort Lucia*, nearly abreast of it. Between these is the channel into the harbour, near a mile wide; both shores are steep; that of *Santa Cruz* is perpendicular, there being six fathoms in the wash of the sea. The narrowness of the channel causes strong tides; but as the sea-breeze blows fresh, they do not impede entering into the harbour. In going in it is best to keep mid channel, or even nearer to *Santa Cruz*. About four miles outside the harbour's mouth, the depth of water is 18 and 19 fathoms, which will decrease gradually to 8 or 7; and this, being the shallowest part, may be called the bar, which is about two miles outside the fort. The water again deepens, on approaching to *Santa Cruz*, to 17 and 18 fathoms, nor will less be found in the fair way of the great road. Large ships may moor in shoaler water, but that depth, or thereabouts, is more advisable, as such a situation affords the full advantage of the sea-breeze, as well as that of avoiding the insects, which are very troublesome when nearer to the shore. In the inner harbour, formed by an island called "*Ilheo dos Cobras*," or *Serpent island*, are proper wharfs for heaving ships down by;

but the mode of doing it alongside hulks is now preferred. In the same harbour will ships anchor, which are loading or unloading goods, or want repairing; but the outer is the more healthy situation. *Rio* is situated in S. lat. $22^{\circ} 54'$, and W. long. $42^{\circ} 44'$. The variation of the compass is $4^{\circ} 55'$ W. of the pole. The tide flows $7\frac{1}{2}$ hours, and rises about $5\frac{1}{2}$ feet perpendicular. Fahrenheit's thermometer, during sir *G. Staunton's* stay, was between 77° and 82° .

The entrance into the harbour, from the sea, is bounded, on one side, by the leaning cone already mentioned, measuring 700 feet in height, and by the huge mass of granite, supporting the castle of *Santa Cruz*, on the other; and is interrupted, near the middle, by the little island on which *Fort Lucia* is erected. On entering into the harbour it was found to enlarge to a width of three or four miles, and to penetrate, in several branches, farther than the eye could reach. It is interrupted with many islands, some entirely green, and some covered with batteries or habitations. The shores of the harbour were diversified and embellished with villages, farms, and plantations, separated by rivulets, ridges of the rocks, indentures of little sandy bays, or the skirtings of a forest; the whole terminated, in distant prospect, by an amphitheatre or screen of mountains, rising in a vast variety of rude and fantastic forms, but covered with trees to their very summits.

Within four miles of the harbour's mouth is situated, on the W., the city of *St. Sebastian*, usually called *Rio*, built on a projecting tongue of land; but all the ground behind it is broken into hills and rocks, with woods, houses, convents, and churches on their tops. A convent of *Benedictines*, and also a fort commanding the town, are situated upon the extreme point jetting into the harbour; opposite to this point is *Serpent island*, between which and the town is a narrow channel, sufficiently deep, however, for the passage of the largest ships. Upon the island are, a dock-yard, magazines, and naval store-houses; and round its shores are the usual anchoring places for the shipping which frequent this port. Beyond the town the harbour begins to widen considerably, and resembles a large lake with many islands upon its surface. In the late improved state of the town, the streets are paved, with the addition of foot-paths, and though some of them are narrow, they are convenient in a hot climate by the shade which they afford. In the squares are refreshing fountains, which supply the water conveyed to them by an aqueduct of considerable length; a circumstance of moment, as *Rio* has no river close to it of any note. This aqueduct is carried over vallies by a double row of arches, one placed above another; and thus presents a structure that adds great ornament to the town. A guard constantly attends at the fountains throughout *Rio*, to regulate the distribution of the water, which is, probably, scanty, as there are people who wait a long time with buckets for their share. A sufficient proportion of the water from the fountain upon the quay opposite to the palace, is allotted for the use of the shipping, and is conveyed to the casks, remaining in the boat, by means of a woollen or canvas tube, called a hose, stretching from the fountain to the cask. Capt. Cook complained that the water was not good; but this circumstance sir *Erasmus Gower* ascribes to some accidental impurities that must have remained in the casks which he filled with it.

The shops of *Rio*, says *Staunton*, were full of *Manchester* manufactures, and other British goods, even to English prints, both serious and caricature. A Portuguese merchant advertising to these supplies of goods, and the advantages gained by the country that furnished them, observed that the prosperity both of *Portugal* and its dependencies

redounded

redounded chiefly to the benefit of England. The benefit has probably been reciprocal; and, it is hoped, will thus continue. The exterior appearance of the inhabitants indicated ease and comfort; their dwellings were generally in good condition, many of them large, and well adapted to the climate; the magazines and markets well stored with merchandize; new buildings, private and public, erected; tradesmen busily employed; and besides the aqueduct and fountains, which adorned the city, it had some public walks, and a spacious quay of granite, of which material, found upon the spot, many of the chief edifices were constructed. The place, however, is said to be unhealthy; and instances of longevity are rare. This insalubrity may be owing, perhaps, to local and temporary circumstances, more than to the necessary influence of the climate. The situation of the town upon a plain, almost wholly surrounded by hills thickly covered with forest trees, deprives it of a free circulation of air, and exposes it to the morning and evening damps of humid nights, preceded by scorching days, and of course putrid and intermitting fevers must often be the consequence. Water is also suffered to stagnate in marshes near the town; and to these disadvantages we may add the tormenting influence of infinite swarms of musquitoes, or large gnats, which attack strangers for some time after their arrival. But none of these real, or any imaginary, evils restrain the propensity of all classes of society towards gaiety and pleasures. See BRASIL.

The inhabitants of Rio are very numerous, and consist of Portuguese, Negroes, and Indians, the original natives of the country. This township, which is but a small part of the capitanea, or province, is said, according to Cook, to contain 37,000 white persons, and 629,000 blacks, many of whom are free, amounting together to 666,000, in the proportion of 17 to 1. The Indians, who are employed to do the king's work in this neighbourhood, can scarcely be considered as inhabitants; their residence is at a distance, from whence they come by turns to their work, which they are obliged to perform for a small pay. The guard-boat was constantly rowed by these people, who are of a light copper colour, and have long black hair. See BRASIL.

When walking abroad, men of the lower classes generally wear cloaks; and those of the middling and higher ranks never appear without swords. The ladies wear their hair hanging down in tresses, tied with ribbands, and adorned with flowers; their heads being uncovered. In their visits to the churches, both at matins and vespers, they are regular; at other times they are generally seated at their windows or balconies. Many of them have fine dark eyes, with animated countenances. In the evenings they amuse themselves by playing on some kind of musical instrument, chiefly the harpsichord or guitar. At this time the doors and windows are thrown open for the admission of cool air. If a stranger should happen to stop to hear the music, it often happens that the father, husband, or brother of the lady that is playing, steps out and politely invites him into the house; and the ladies, not unfrequently, having bunches of flowers in their hands, exchange them with gentlemen as they pass by. This practice may perhaps be an imitation of that of the ladies of Lisbon, who on particular days, called "days of intrusion," throw nosegays from their balconies upon persons walking under them. Captain Cook charges the same indelicate want of reserve on the ladies of Rio; but we trust the accusation which some persons have brought against them, that there is not one modest woman among them, is not only too general, but founded on a misrepresentation of what they may conceive to be an allowable practice, founded in custom and courtesy. Some of the

men, however, have been accused of much worse practices, in yielding to depraved and unnatural appetites.

Among the more innocent pleasures of both sexes are operas, plays, and masquerades. Company often assembles at a garden, situated near the sea, at one extremity of the town, and laid out in grass plots, shrubberies, and parterres, ornamented in various ways. In these recesses the gay society of Rio, after taking the exercise of walking in the evening, and after hearing songs and music, sit down to partake of banquets, occasionally accompanied by music and fire-works. On the side of this garden next the sea is a terrace, and at the extremities of the terrace there are two neat square buildings, like English summer-houses. In one the walls are decorated with paintings, representing views of the harbour, and particularly of the whale-fishery, which was formerly carried on in it; until the large black whale, which formerly frequented it, was disturbed and driven away, in consequence of the increased concourse of shipping. The ceiling of this and the other summer-house are covered with various appropriate devices, in shell or feather work; and the walls of the latter are decorated with eight large paintings, descriptive of the principal productions to which the country is indebted for its opulence, including views of the diamond and gold mines, with the operations performed in them; of the cultivation of the sugar-cane, and the processes by which its juice is extracted and granulated into sugar; of the manner of collecting the small animals which produce the cochineal, and preparing the rich dye from them; of the culture of the manioc, with the process of making cassada and tapioca; and of the culture and preparation of coffee, rice, and indigo. Near the town is another garden, originally intended for promoting the progress of botany, but now chiefly curious for a small manufacture of cochineal; but the garden at Rio does not produce annually above 30 pounds of this commodity. The preparation of cochineal, however, is now encouraged by the trade being laid open, which was formerly a monopoly to the crown. Another species of manufacture is carried on in the vicinity of Rio; an exclusive privilege having been given to a company, upon paying one-fifth of its profits to the crown. To this harbour was brought, for the purpose of converting it into oil, the blubber or firm fat of the black whales. The whalebone or cartilages of the jaw were also properly separated and cleaned here, before they were sent to Europe. In another part of the harbour of Rio, called Val Lengo, are warehouses for the reception and sale of slaves. See BRASIL.

The establishment for the defence of Rio consists of two squadrons of cavalry, two regiments of artillery, six regiments of infantry, two battalions of disciplined militia, beside above 200 disciplined free Negroes; making, in the whole, a body of at least 10,000 men, exclusively of a very numerous registered but undisciplined militia, of whom a considerable proportion is in the city and its neighbourhood. The entrance of the harbour, which is scarcely a mile from point to point, is crossed in every direction by heavy batteries. The fort of Santa Cruz is a work of some strength, and the principal defence of the harbour. But the defence of the city of Rio is supposed to depend chiefly on the works erected on the Serpent island, which is about 300 yards long: it mounts 46 guns, 20 facing the south and south-east, and the remainder looking to the opposite points. The parapet, along the front of the town, recently constructed, will afford a good line for musquetry and light guns.

The high conical rocks at the entrance of the harbour of Rio, and the surrounding hills, are all of granite, in which

the only remarkable circumstance is the large proportion of feld-spath contained in it. About two miles within the harbour, on the south-west side, is one high rock, entirely composed of columnar masses, bearing the resemblance of basalt: it rests upon clay. In all the quarries of granite it is found incumbent upon clay and sand. Here are three species of granite: the first, red-coloured, soft, and shining; the second, deep blue coloured, harder, and of a closer texture; and the third of a whitish shining colour, containing much mica, and little feld-spath; its texture soft, and incapable of a good polish.

The government of Rio is, as to its form, mixed; and yet, in fact, very despotic. It consists (we are now speaking of its state before the removal of the Portuguese government thither) of the viceroy, the governor of the town, and a council. To restrain the people from travelling into the country, and penetrating into any district where gold or diamonds may be found, certain bounds are prescribed to them, at the discretion of the viceroy, sometimes at a few, and sometimes at many, miles distance from the city. On the verge of these limits a guard constantly patrols, and any person that goes beyond it is seized and thrown into prison.

The riches of this place consist chiefly in the mines, that lie at a considerable distance in the country, from which much gold is brought, at the expence of many lives. Precious stones are also found here in such plenty, that a certain quantity only is allowed to be collected in a year: they are diamonds, topazes of several kinds, and amethysts. The mines called "general" are the nearest to the city, at the distance, according to the statement of M. Bougainville, in his account of his voyage round the world, of about 75 leagues. They yield to the king every year, for his right of fifths, at least 112 arrobas of gold: in 1762 they yielded 119. Under the captaincy, the *MINAES Geraes* (which see) are comprehended those of Rio de Morte, of Sabara, and of Serro-frio. The last, besides gold, produces all the diamonds that come from Brazil. They are found at the bottom of a river, of which they turn the course, in order to separate from the pebbles in its bed the diamonds, topazes, chrysolites, and other stones of inferior quality. Of all these stones, the diamonds alone are contraband: they belong to the undertakers, who are obliged to give an exact account of the diamonds found, and to place them in the hands of the intendant appointed by the king for this purpose, who deposits them immediately in a casket encircled with iron, and shut with three locks. He has one of the keys, the viceroy another, and the assayer of the royal treasury the third. This casket is enclosed in a second, sealed by the three persons above-mentioned, and which contains the three keys of the first. The viceroy has not the power of visiting its contents: he only consigns the whole to a third strong coffer, which he sends to Lisbon, after having set his seal on the lock. They are opened in the presence of the king, who chooses what diamonds he pleases, and pays the price to the undertakers at the rate fixed by their agreement. The undertakers pay to his most faithful majesty the value of a piastre Spanish money, for every slave employed in searching for diamonds; and the number of these slaves may amount to 800. Of all kinds of contraband trade, that of diamonds is the most severely punished.

The gold drawn from the mines cannot be carried to Rio de Janeiro, without being first brought to the smelting houses established in each district, where the right of the crown is received. What remains to private persons is remitted in bars, with their weight, number, and the royal arms.

Those bars belonging to individuals are registered in the factory of La Prayburia, 30 leagues from Rio de Janeiro. In this station are a captain, lieutenant, and 50 men; here is paid the right of fifths; and, besides, a toll of a real and a half *per* head on men, cattle, and beasts of burthen. Half of the product of this duty belongs to the king, and the other half is divided between the detachment according to rank. As it is impossible to return from the mines without passing by this office, all persons are there stopped, and searched with the greatest severity. Individuals are afterwards obliged to carry all the gold in bars, which belongs to them, to the mint of Rio de Janeiro, where the value is given in coin, commonly in half doubloons, each worth eight Spanish dollars. Upon each of these half doubloons the king gains a dollar, by the alloy and the right of coinage. The mint of Rio Janeiro is one of the most beautiful which exist; it is furnished with every convenience to work with the greatest celerity. As the gold arrives from the mines, at the same time that the fleets arrive from Portugal, it is necessary to accelerate the work of the mint, and the coinage proceeds with surprising quickness. The arrival of these fleets renders the commerce of Rio Janeiro very flourishing, but chiefly that of the Lisbon fleet. The mines of St. Paolo and Parnaqua yield to the king four arrobas for the fifths every year. The most distant mines, as those of Pracaton and Quiaba (Cuyaba), depend on the captaincy of Matogrosso. The fifth of the above mines is not received at Rio Janeiro, but that of the mines of Goyas is deducted. This captaincy also possesses diamond mines, the working of which is prohibited.

The whole of the expence of the king of Portugal at Rio Janeiro, for the payment of the troops and civil officers, and for the charges of the mines, the maintenance of the public buildings, the careening of vessels, amounts to about 600,000 dollars. The expences of building ships of the line and frigates there stationed are not included.

Recapitulation, and Amount of the Average of different Objects of royal Revenue.

	Dollars.
150 arrobas of gold, the average produced by the royal fifths, are in Spanish money	1,125,000
The duty on diamonds	240,000
The duty on coinage	400,000
Ten <i>per cent.</i> from the custom-house	350,000
Two and a half <i>per cent.</i> of free gift	87,000
Right of toll, sale of employments, officers, and generally all the profits of the mines	225,000
Duty on slaves	110,000
Duty on fish-oil, salt, soap, and the tenth on the provisions of the country	130,000
Total	2,667,000

From which, deducting the above expences, it will appear that the king of Portugal draws from Rio Janeiro a revenue exceeding 10,000,000 of French livres, or 416,666*l.*

The coin that is current here, is either that of Portugal, consisting chiefly of 36*s.* pieces, or pieces both of gold and silver, which are struck at this place: the pieces of silver, which are very much debased, are called patacks, and are of different value, being easily distinguished by the number of rees marked on the outside. Here is also a copper coin, like that in Portugal, of five and ten ree pieces. See *REE.*

Upon the whole, Rio de Janeiro is a very good place for ships to put in at that want refreshment: the harbour is safe and commodious; and provisions, except wheaten bread and flour, may be easily procured: as a succedaneum for bread, here

here are yams and cassada in plenty: beef, both fresh and jerked, may be bought, says Cook in 1768, at about $2\frac{1}{2}d.$ a pound, but it is very lean. The people here jerk their beef by taking out the bones, cutting it into large but thin slices, then curing it with salt, and drying it in the shade: it eats very well, and if kept dry, will remain good a long time at sea. Mutton is scarcely to be procured, and hogs, and poultry, are dear. Of garden-stuff and fruit there is abundance; but none can be kept at sea except the pumpkin: rum, sugar, and molasses, all excellent in their kind, may be had at a reasonable price; tobacco is also cheap, but not good. Cook's Voyages by Hawkesworth, vol. ii. Staunton's Embassy, vol. i.

Rio Infanta. See Great Fish river.

Rio de Jimones, a river of the island of Cuba, which runs into the Spanish Main, N. lat. $20^{\circ} 21'$. W. long. 78° .—R. Mino, a river of Jamaica, which runs into the sea, on the W. side of Carlisle bay.

Rio das Mortes, a town of Brasil, in the jurisdiction of Minaes Geraes, situated on a river of the same name, which runs into the Parana.

Rio Negro, a considerable river of South America, which runs from the river Oronoko, in the kingdom of Granada, and enters the river of the Amazons, near Fort Rio Negro. S. lat. $3^{\circ} 15'$. W. long. $61^{\circ} 31'$.—R. Nuevo Bay, a bay on the N. coast of Jamaica. N. lat. $18^{\circ} 26'$. W. long. $76^{\circ} 46'$.—R. de Oro, a river of the island of Chiloe, which runs into the Pacific ocean, S. lat. $42^{\circ} 45'$.—R. de Ouro, a river of Africa, which runs into the Atlantic, N. lat. $23^{\circ} 52'$. W. long. 16° .—R. de las Palmas. See PALMAS.—R. das Palmas. See SCHERERO.—R. de la Plata. See PLATA.—R. des Patos, a river of Brasil, which runs into the Atlantic, S. lat. $28^{\circ} 30'$.—R. des Pedras, a river of Africa, which runs into the Atlantic, N. lat. $9^{\circ} 10'$.—R. de Pinos, a river of the Isthmus of Darien, which runs into the Spanish Main, N. lat. $9^{\circ} 12'$. W. long. $80^{\circ} 25'$.—R. de Puercos, a harbour on the N. coast of Cuba, S.W. of Bahia Honda.—R. de los Rabados, a river of Chili, which runs into the Pacific ocean, S. lat. $45^{\circ} 10'$.—R. dos Ramos, a river of Africa, which runs into the Atlantic, S. lat. $14^{\circ} 37'$.—R. Real, a river of Brasil, which divides the captainship of Sergippe from that of All-Saints. This river, if it were not for the bar at the entrance, on which there is but ten feet of water, would be an inlet to the most fertile and pleasant part of the Brasils. Over the bar there is room enough, and depth of water sufficient, for the whole navy of England to ride in safety. About four leagues above the mouth, this river divides itself into four large branches, one running N.N.W. called Rio Fundo, another N.W. navigable for any vessel that can get near the bar, as far as the towns of St. Lucia and St. Eustatia, from the latter of which it takes its name, a third, called Rio de Pao Grand, or Great Timber river, which runs W.N.W. The main branch, which runs W.S.W. is also navigable as far as the town of Bahia, about 20 leagues from its mouth. On the banks of these branches there are many fine plantations, and small villages, which send great quantities of sugar, tobacco, and mandioc to Bahia or Fernambuco, as the wind permits. This river runs into the sea through four channels, formed by three small sandy islands, lying in the mouth of it. About 12 leagues to the S. of Rio Real is a small harbour, called Torre Garcia de Avilla, defended by four pieces of cannon; the town lies about a mile above the port, on the highest land on this coast; and it is the best for a ship to make, that is bound to Bahia, while the N.E. wind blows.—R. del Rey, or River Real, a river of Africa, which runs into the At-

lantic, N. lat. $4^{\circ} 30'$. E. long. $8^{\circ} 5'$. This river may be distinguished by the extreme high lands of Amboyes, between it and the river Camarones, situated S.E. from the mouth. It appears like a deep large bay running N., 21 or 24 miles wide at the entrance, where the ground is oozy; the channel being exactly in the middle, free from shoals and sands, except near the E. side, which is foul; the shore on both sides is low and marshy. The river which comes far from the N., is wide for a long interval into the country, and receives several considerable rivers in its course: the adjacent lands are populous and full of villages. The principal trade consists in slaves and large elephants' teeth, and akkori or blue coral. The inhabitants are called *Calbongas* (which see).—R. dos Reyes Magos, a river of Brasil, which runs into the Atlantic, S. lat. $19^{\circ} 20'$.—R. St. Balardo, a river of New Albion, which runs into the Pacific ocean, N. lat. $34^{\circ} 44'$.—R. St. Andre, a river of Chili, which runs into the Pacific ocean, S. lat. $35^{\circ} 40'$.—R. St. Maria, a river of Chili, which runs into the Pacific ocean, S. lat. $51^{\circ} 36'$.—R. de Sal, a river of Mexico, which rises in the province of Culiacan, on the borders of New Biscay, and runs into the Pacific ocean, N. lat. $23^{\circ} 40'$.—R. Salado, a river of South America, in the province of Tucuman, which rises about 60 miles W. of Salta, and first bears the name of "Rio del Passage," but being joined by several smaller streams, it changes its name to Salado, and runs into the Parana at Santa Fé, in the province of Buenos Ayres; its whole course being about 500 miles.—R. Salado, or R. des Apaches, a river of North America, one of the branches of the river Bravo, which joins the main stream, about N. lat. $30^{\circ} 40'$. W. long. 86° .—R. Salado, a river of South America, which in the latter part of its course, divides Chili from Peru, and runs into the Pacific ocean, S. lat. $26^{\circ} 15'$.—R. de los Sauces, a river of South America, which rises in Patagonia, and runs into the Atlantic by two streams, forming between them a considerable island and the southern mouth of the bay of Anegada, S. lat. $39^{\circ} 45'$.

Rio Seco, a town of Portugal, in the province of Beira, on the borders of Spain; 7 miles S.S.E. of Almeida.—R. Seco, a river of Peru, which runs into the Pacific ocean, S. lat. $7^{\circ} 6'$.

Rio Secundo, a town of South America, in the province of Cordova, on the river Secundo; 30 miles S. of Cordova.—R. Selbola. See SCHERERO.—R. Sin Fondo, a river of Chili, which runs into the Pacific ocean, S. lat. $43^{\circ} 50'$.—R. del Spiritu Santo. See MANICA.—R. das Trombetas, a river of Brasil, which runs into the river of the Amazons at Pauxi.—R. de Vacas, a river of Mexico, which runs into the Pacific ocean, N. lat. 14° .—R. Verde, a river of Peru, which runs into the Pacific ocean, N. lat. 1° .

Rio Verde, a town of Mexico, in the province of Guaf-teca; 90 miles N.W. of St. Yago de los Valles.

RIOBAMBA, a jurisdiction of South America, in the vicerealty of New Granada and audience of Quito; situated to the south of the assiento of Latacunga. This jurisdiction is divided into two departments; the corregidor, who resides at Riobamba, appointing a deputy, who lives at the assiento of Hambato, situated between the capital and Latacunga. The first department contains 18 principal villages. The productions and manufactures of the province of Riobamba excel all the rest of the provinces of Peru. In various parts it has rich mines of gold and silver. The jurisdictions of Riobamba, Alaqui, and Cuenca, by means of the warehouses at Yaguache and Noranjel, carry on a considerable trade with Guayaquil. This trade, in the manufactures of the country, which consist only of three forts, cloth,

cloth, bags, and linen, is attended with considerable profit to the dealers, and advantage to the country, as all the poor people, who are remarkably numerous, and persons of substance, except those of the capital, wear the goods manufactured in the country. Part of the wheat produced in the jurisdiction of Riobamba and Chimbo is sent to Guayaquil. This jurisdiction is (by mistake) described under *Hambato* (which see). We shall here subjoin an account of Hambato. This assiento stands in a wide plain at the bottom of a mountain, N. of Riobamba. On its N. side runs a large river, which has a bridge; the river having never been fordable on account of its depth and extreme rapidity. It is finely situated, and in extent of populousness nearly equal to Latacunga; the number of its inhabitants amounting to eight or nine thousand. The houses are built of unburnt bricks, well planned, and make a good appearance. They are of low elevation, for the purpose of avoiding the destructive effects of earthquakes. Here are a parish church, two chapels of ease, and a convent of Franciscans. The earthquake which made such terrible havoc in the assiento of Latacunga proved also fatal to this, the horrors of which were augmented by the terrible eruptions from mount Carguarifo, in consequence of which a muddy torrent, formed of ashes, cinders, and snow melted by the flames of the aperture, precipitated down the sides of the mountain, overflowing the fields, sweeping away the cattle, and every thing else in the way by its violence. The inhabitants, in their manners and customs, resemble those of Quero; but it has fewer families of distinction than Riobamba. The bread made at this assiento is famous all over the province, and accordingly it is sent to Quito and other parts, without being deteriorated by length of time. It has six villages. The Indian inhabitants of the village of Quero make all sorts of cabinet work; that of Petate is equally famous for abundance of sugar-canes and the excellent quality of its sugar; and that of Santa Rosa de Pilaguin, which, with its fields, lies on the side of Carguarifo, is famous for the goodness of its barley, as the district bordering on the assiento is for its exquisite fruits; and to this district Quito owes most of the European kinds sold in that city. See QUITO and GRANADA.

RIOBAMBA, the capital of the jurisdiction above-mentioned, and described under HAMBATO. This elegant town, by the devastation occasioned by the terrible earthquake on the 4th of February 1797, became a heap of ruins, and soon totally disappeared; for the peak of Sicalpa falling on the town, and stopping the two rivers which pass by it, formed a lake, so that even the ruins were not visible. Of 9000 inhabitants, only about 400 escaped. Although Quito sustained little damage, Latacunga, and all the hamlets in its corregimiento, were utterly destroyed. Many persons perished, and the survivors were infected by the putridity of the dead bodies. Near Hambato many mountains split, and by their sudden fall occasioned still more awful destruction among the human race. Quero, mentioned in the preceding article, with all its people were buried, in an instant, under a cliff which fell on the town. Pelileo was overwhelmed by a stream of water and mud; the circumjacent lands were all transposed; and a deadly silence indicated the general ruin. Alausi and Guaranda also suffered greatly. The fate of Cuenca, Loja, Jaen, and Guayaquil, was, at that time, unknown; but the shocks do not seem to have extended so far. The cause of this desolation seems to have proceeded from the volcano Tangarunga or Tangungua, between Latacunga and Riobamba; as the tremendous subterraneous thunders all proceeded from

that quarter, and the greatest ruin was in its vicinity; towards the N. the earthquake was faintly perceived at Païto. Riobamba is distant 90 miles S. from Quito. S. lat. $1^{\circ} 20'$. W. long. $78^{\circ} 30'$. See QUITO.

RIOCHICO, a town of New Mexico, in the province of Hiaqui, on the river Hiaqui; 800 miles N.W. of Mexico. N. lat. $29^{\circ} 4'$. W. long. $111^{\circ} 36'$.

RIOFRIO, a town of Spain, in Old Castile; seven miles S. of Segovia.

RIOJA, a town of South America, in the province of Tucuman; 240 miles W.S.W. of St. Yago del Estero. N. lat. $29^{\circ} 15'$. W. long. 70° .

RIOLAN, JOHN, in *Biography*, an able French physician, was born at Amiens. He was greatly distinguished by his attainments both in literature and science, and is said not only to have written and spoken the learned languages with facility, but to have been thoroughly intimate with the contents of almost all the writings of the ancients. He gave lessons in natural philosophy at the college of Boncour, at Paris, where he took his degree in the year 1574. Little is recorded respecting his life, but that he was elected dean of the faculty in 1586, and continued in that office in the following year. He died on the 18th of October 1606. He was one of the greatest ornaments of the profession at Paris in his time; and was a strenuous advocate for the doctrine of Hippocrates and the ancients, whom he defended with great ardour against the chemists. His works are indicative of genius; they were collected and published, together with some posthumous tracts, at Paris, in 1610, under the title of "Opera Omnia." Separately, we find the following; "De Primis Principiis Rerum Naturalium, Libri tres," Paris, 1571. "Ad Impudentiam quorundam Chirurgorum, qui Medicis æquare et Chirurgiam publicè profiteri volunt; pro veteri dignitate Medicinæ Apologia philosophica," ib. 1577. This was a sort of declaration of war against the surgeons, whom he attacked for attempting to teach without any knowledge of literature; it was followed by several pieces on both sides. "Commentarii in sex posteriores Physiologiæ Ferneliæ Libros," 1577. "Ars bene Medendi," Lugd. 1589. "Ad Libros Ferneliæ de abditis rerum causis Commentarii," Par. 1598. "Univerſæ Medicinæ Compendium," 1598. "Ad Libavii Maniam Responſio, pro Censura Scholæ Parisiensis contra Alchymiam latâ," 1600. "Chirurgia," Lips. 1601. "Prælectiones in Libros Physiologicos et de abditis rerum causis. Accesserunt Opuscula quædam Philosophica," 1602. "De Febribus," 1640.

RIOLAN, JOHN, the son of the preceding, was born at Paris in the year 1577. His father did not fail to afford every encouragement and opportunity for the cultivation of his rising talents, and his mind was naturally turned to the study of medicine by the reputation, zeal, and love of the profession, which the former possessed; his early studies were also greatly facilitated, and many difficulties removed, by the domestic instruction which he thus received. His progress accordingly was uncommonly rapid; and a very few years after he had received his degree in 1604, he came forward as an author in a way that laid the foundation of his subsequent reputation. In 1613 he was appointed royal professor of anatomy and botany by Louis XIII.; and in this latter capacity he petitioned the king for the establishment of a botanic garden in the university of Paris. He subsequently held the appointment of physician to queen Mary de Medicis, and accompanied that princess in her travels; he arrived at Cologne, after her death, in July 1642, and returned to Paris, where he resumed the practice

of his profession. After having twice undergone the operation of lithotomy, he lived to the age of eighty years, and died at Paris in February 1657.

Riolan was devoted to the study of anatomy, and was one of the most expert and learned anatomists of his time; his learning, indeed, was rather an obstacle in the way of his progress as a discoverer, or perhaps we should say his devotion to the ancients; for, in many cases, he seemed to see only through their eyes. Yet he was arrogant in his claims to originality, and by his pertinacity and sarcastic contempt of others, he raised himself many opponents and enemies. He published several original observations, however, respecting many parts of anatomical science, especially respecting the structure of the colon, the biliary ducts, the uterus and vagina, the tongue, os hyoides, &c. None of his anatomical works contain any engravings; as he maintained that no representations could supersede the study of nature. All his studies, however, were not confined to anatomy, as the following list of his works will evince. "Brevis excursus in Battologiam Quercetani, quo Alchemiæ principia funditus diruuntur, et Artis veritas demonstratur," Par. 1604. "Comparatio veteris Medicinæ cum nova, Hippocraticæ in Hermetica, Dogmaticæ cum Spagyrica," 1605. "Disputatio de Monstro Lutetiæ 1605 nato." "Incurfionum Quercetani depulsio," id. "Censura demonstrationis Harveti pro veritate Alchymicæ," 1606. "Schola Anatomica novis et raris observationibus illustrata. Adjuncta est accurata fœtus humani hystoria," 1607; enlarged by the author with the title of "Anatome corporis humani," 1610. "In Librum Cl. Galeni de Ossibus, ad Tyrones explanationes apologetica pro Galeno, adversus novitios et novatores Anatomicos," 1613. "Gigantomachie," 1613, written in refutation of Hæcicot's account of the discovery of the bones of the giant Teutochus. Riolan published two other tracts, or more, upon this controversy, which ended with the appearance of his "Gigantologie; discours sur la grandeur des Géants, &c." in 1618. "Olleologia ex veterum et recentiorum præceptis descripta," 1614. "Discours sur les Hermaphrodites, où il est démontré, contre l'opinion commune, qu'il n'y a point de vrais Hermaphrodites," 1614. "Anatomica, seu Anthropographia," 1618. "Enchiridium anatomicum et pathologicum," 1648, and many times reprinted; the best edition is of Paris, 1658. "Opuscula anatomica nova," Lond. 1649, containing remarks on the anatomical works of the most celebrated physicians, and an attack upon Harvey, and his doctrine of the circulation, of which Riolan was a great antagonist. "Curieuses Recherches sur les écoles de Médecine de Paris et de Montpellier," 1651. He also published three different works, entitled "Opuscula anatomica," in 1650, and the three following years, opposing the doctrines of Bartholine and Pecquet, respecting the absorbents and lacteals, and Harvey's on the circulation; and two more on the same subjects, with the titles of "Responso prima, et altera," 1652 and 1655. Eloy Dict. Hist. de la Med.

RIOLI, in *Geography*, a town of Naples, in Capitanata; 11 miles S. of Manfredonia.

RIOLO, a town of Italy, in the department of the Amone; nine miles W. of Faenza.

RIOM, a town of France, in the department of the Cantal, and chief place of a canton, in the district of Mauriac; 15 miles E.N.E. of Mauriac. The place contains 714, and the canton 7498 inhabitants, on a territory of 210 kilometres, in 12 communes.

RIOM, a town of France, and principal place of a district, in the department of the Puy-de-Dôme; eight miles N. of

Clermont-Ferrand. The place contains 13,328 inhabitants in both its E. and W. divisions; the canton of the former includes 12,433, and the latter 12,441 inhabitants; the territory of the former being 70, and that of the latter 24½ kilometres, the former having seven, and the latter five, communes. N. lat. 45° 43'. E. long. 3° 11'.

RIONDO, in *Ichthyology*, a name used by some for the fish more commonly called *aper*, a small fish, of the shape of the faber or doree, caught in the Mediterranean.

RIONE, or RIONI, in *Geography*, a river of Asia, anciently called "Phasis," which rises in the principality of Georgia, and forming the southern boundary of Mingrelia, runs into the Black sea, N. lat. 42° 15'. E. long. 41° 25'.

RIONS, a town of France, in the department of the Gironde; three miles N.W. of Cadillac.

RIOPA, a town of Spain, in New Castile; 13 miles S. of Alcaraz.

RIOS, a town of France, in the department of the Upper Saone, and chief place of a canton, in the district of Vesoul. The place contains 578, and the canton 9028 inhabitants, on a territory of 230 kilometres, in 34 communes.

Rios, a town of Chili; 90 miles N.N.E. of Valparayso.

RIOSECO, a town of Spain, in the province of Leon; 96 miles N.N.W. of Madrid. N. lat. 41° 52'. W. long. 5° 7'.

RIOT, in *Law*, the forcible doing of an unlawful thing, of a private nature, by three or more persons assembled together for that purpose; either with or without a common cause or quarrel (3 Inst. 176.): as if they beat a man; or hunt and kill game in another's park, chase, warren, or liberty; or do any other unlawful act with force and violence; or even do a lawful act, as removing a nuisance, in a violent and tumultuous manner.

The word is formed from the Latin *riota*, of *arietare*, to run at each other as rams do. Though, from an ancient Gaulish version of the bible, quoted by Skinner, *riot* should rather seem originally to signify luxury and excess; whence our law *riot* might proceed; because these are frequently attended with quarrels.

For the difference between a riot, rout, and unlawful assembly, see *ROUT*, and *UNLAWFUL Assembly*.

The punishment of riots and routs, where a number of persons from three to eleven are concerned, is, by the common law, fine and imprisonment only; to which, in very enormous cases, the pillory has been sometimes superadded. (1 Hawk. P.C. 159.) And by the stat. 13 Hen. IV. c. 7. any two justices, together with the sheriff or under-sheriff of the county, may come with the posse comitatus, if need be, and suppress any such riot, assembly, or rout, arrest the rioters, and record upon the spot the nature and circumstances of the whole transaction; which record alone shall be a sufficient conviction of the offenders; and it is held that any battery, wounding, or killing the rioters, that may happen in suppressing the riot, is justifiable. The riotous assembling of twelve persons or more, and not dispersing upon proclamation, was first made high treason by stat. 3 & 4 Edward VI. c. 5. but repealed by stat. 1 Mary, c. 1. Nevertheless, the offence was made a single felony by 1 Mar. stat. 2. c. 12. and by 1 Eliz. c. 16. with whom the law expired. However, it was revived, in order to support the execution of the act of settlement, and made perpetual by 1 Geo. I. c. 5. which enacts, that if any twelve persons are unlawfully assembled to the disturbance of the peace, and any one justice of the peace, sheriff, under-sheriff, or mayor of a town, shall think proper

proper to command them by proclamation to disperse, if they contemn his orders, and continue together for one hour afterwards, such contempt shall be felony, without benefit of clergy. And farther, if the reading of the proclamation be by force opposed, or in any manner wilfully hindered, such opposers and hinderers are felons, without benefit of clergy; and all persons concerned, knowing of such hindrance, and not dispersing, are felons, without benefit of clergy. And the act indemnifies the peace officers, and their assistants, if they kill any of the mob in endeavouring to disperse them. Moreover, if any persons, so riotously assembled, begin, even before proclamation, to pull down any church, chapel, meeting-house, dwelling-house, or out-houses, they shall be felons, without benefit of clergy. Blackst. Comm. book iv. ch. xi.

RIOU, in *Geography*, a small island in the Mediterranean, near the coast of France. N. lat. $43^{\circ} 11'$. E. long. $6^{\circ} 25'$.

RIOU'S *Island*, or *Rovaboga*, an island in the Pacific ocean, about 24 miles in circumference; discovered in the year 1792, by lieutenant Herget, commander of the *Dædalus* storeship. S. lat. $8^{\circ} 50'$. E. long. $220^{\circ} 50'$.

RIOXA, a province of Spain, situated in Old Castile, on the borders of Biscay, on the banks of the Ebro.

RIPA CANDITA, a town of Naples, in the province of Basilicata; six miles S.W. of Venosa.

RIPA *Limesara*, a town of Naples, in the county of Molise; nine miles E. of Molise.

RIPA *Tranfona*, a town of the marquisate of Ancona, the see of a bishop, suffragan of Fermo; 12 miles N.E. of Ascoli. N. lat. $42^{\circ} 58'$. E. long. $13^{\circ} 49'$.

RIPAILLE, a town of France, in the department of the Lemane lake, on the S. side of the lake of Geneva, with a convent; one mile N. of Thenon.

RIPEN, a sea-port of Denmark, in North Jutland, on the Gram; the see of a bishop, and capital of the diocese. This town was probably built about the time of the introduction of Christianity into this kingdom, and, next to Wiborg, is deemed the most ancient town in North Jutland. It was formerly one of the most celebrated and flourishing cities in the North; as it had four parish churches and five chapels, besides the cathedral, four convents with their churches, a strong castle, and between 600 and 700 free burghers. A considerable number of ships traded to Norway, France, England, Holland, &c. from this port; and the city had the privilege of coining money. But its grandeur and opulence were almost annihilated by a dreadful fire in 1580, and other conflagrations, by inundations, and by the ravages of war. The merchants' old Exchange is converted into a town-house. Some little trade is still carried on at this place, in grain, horned cattle, horses, &c.; but the shallowness of the river admits only small vessels to come up to the city, and these only at high water; 77 miles S. of Wiborg. N. lat. $55^{\circ} 21'$. E. long. $8^{\circ} 46'$.

RIPENERS, in *Medicine*, a sort of topical remedies, called also *drawers*, *digestives*, *maturantia*, *suppuratives*, &c. See MATURATION.

RIPENING of *Fruit*, in *Gardening*, may be forwarded several ways. See CAPRIFICATION, HOT-BEDS, and FORCING.

RIPERA, in *Geography*, a town of Hindoostan, in Berar; 25 miles N.E. of Notchegong.

RIPERTNAU, a town of Westphalia, in the county of Lippe; three miles E.N.E. of Lemgow.

RIPIENO, Ital. in *Music*, implies full, in opposition to solo. In Corelli's concertos, the solo parts are said to

be *del concertino*, the little concert; and the *tutti* parts, or *ripieno*, *del concerto grosso*, of the great concert. The first eight of Corelli's concertos were composed for the church, *a due cori*, for two bands or choirs, which are often in dialogue. By ripieno is always meant a subordinate part, to which few difficulties are entrusted; being what the French call *complissage*, or parts to fill up and complete the harmony.

RIPIERS, RIPIARI, in our *Old Writers*, those that bring fish from the sea-coast to the inner parts of the land.

They were thus called a *fsella*, *qua in devehendis piscibus utuntur*, *Anglice*, a rip.

RIPLEY, in *Geography*, a market-town and parish, partly in the lower, and partly in the upper division of the wapentake of Claro, West-riding of Yorkshire, England, is five miles N.W. from Knaresborough, and 214 miles N.N.W. from London. The town had formerly a castle attached to it, some part of which is yet standing. The market here is held on Monday, weekly; and there are annual fairs on Easter Monday, and the 25th, 26th, and 27th days of August, for horses, horned cattle, and sheep. A free-school at this place, as appears from an inscription over its entrance, was built and endowed in the year 1702, by Mary, and Catharine Ingilby, daughters of sir William Ingilby, then lord of the manor. The church is ancient, and contains many monumental erections in memory of that family. In the church-yard stands the pedestal of an ancient cross, which contains eight niches curiously ornamented, but the effigies are gone, as likewise the shaft of the cross. This parish, according to the parliamentary returns of 1811, contains 222 houses, and 1053 inhabitants.

Ripley-castle, the seat of sir John Ingilby, baronet, adjoins the town. The chief part of it was built by sir William Ingilby, in the reign of Philip and Mary, but the great tower is far more ancient, having belonged to a former structure. It has been much enlarged of late years; and is now a stately and commodious family mansion. Some of the apartments are finished with great elegance; and the staircase displays a large Venetian window of stained glass, on which is represented a series of shields, shewing the quarterings and inter-marriages of the Ingilby family, since their settlement at Ripley, towards the close of the fourteenth century.

Eastward from Ripley is Copgrove, an elegant mansion belonging to H. Duncombe, esq. which contains an excellent collection of paintings, busts, and prints from the most celebrated masters. The pleasure-grounds are extensive, and are ornamented with a fine lake. Near this seat is that of Allerton-Mauleverer, the property of lord Stourton. The house is a modern edifice, built by his royal highness the duke of York. It is surrounded by a park, containing 400 acres of land, chequered by hills and dales. At this place was formerly a priory of Benedictines, subject to the abbey of Marmontier in France. It was founded by Richard Mauleverer in the reign of Henry II., and was dissolved by Henry VI. who settled its revenues on King's college, Cambridge. Beauties of England Wales, vol. xvi. by John Bigland.

RIPOGONUM, in *Botany*, so called by Forster, from $\rho\acute{\iota}\lambda\acute{o}\varsigma$, $\rho\acute{\iota}\pi\acute{o}\varsigma$, a slender twig, and $\gamma\acute{o}\nu\alpha$, a joint, because of its slender, jointed, twining habit, was referred by the son of the author, as well as by the younger Linnæus, to SMILAX; (see that article.) Mr. Brown, nevertheless, retains *Ripogonum*, in Prodr. Nov. Holl. v. 1. 293, because of its hermaphrodite flowers, the two bractæas at the base of each, and the racemose inflorescence. Two species are mentioned,

R. album and *parviflorum*, the latter of which is Forster's plant, *Smilax Ripogonum*, Forst. Prodr. 70.

RIPOLL, in *Geography*, a town of Spain, in Catalonia; 14 miles N. of Vique.

RIPON, or RIPPON, a market and borough town in the lower division of the wapentake of Claro, liberty of Ripon, West-riding of Yorkshire, England, is situated at the distance of 11 miles N. from Harrowgate, and 222 miles N.N.W. from London. It occupies the declivity of a gentle eminence, between the rivers Ure and Skell, and not far from their confluence. Over these rivers are six bridges, within a mile of the town. One of these is a very handsome structure of stone, and has seventeen arches. The town is large, and the buildings are in general good; particularly in the principal street. According to the parliamentary returns of 1811, the parish contains 452 houses, and 2346 inhabitants, but this does not appear to include the borough, which is omitted in the reports.

The origin of Ripon is to be referred to a very remote era. By Salmon, it is supposed to have been the Roman *Ifurium*, but this opinion is erroneous. The probability on the subject is, that it owes its foundation to the monastery which was established here in the year 661, by Eata, abbot of Melros, in Scotland. About that period we find it first mentioned in historical record, when it is said to have consisted only of thirty houses. This town was destroyed by the Danes, and remained a heap of ruins for several years. At length, however, it was rebuilt; and in the year 886, king Alfred is said to have incorporated it as a royal borough, to be governed by a *vigillarius*, or wakeman, twelve elders, and twenty-four assistants. Ripon was destroyed a second time by king Edred in revenge of a revolt of the Northumbrian Danes. This event occurred in the year 950; after which Ripon was again rebuilt and began to flourish, but did not long remain in a state of tranquillity. In the year 1069 it once more shared in the fatal consequences of a revolt of the Northumbrians against the Norman Conqueror; and sixteen years later, at the time of the general survey, the town, and the country around it, still remained waste and uncultivated. Peace having been restored, however, Ripon again revived from its embers, and continued in a prosperous condition, till the wars between England and Scotland, in the reign of Edward II. subjected it to new misfortunes. In the year 1323, Robert I. king of Scotland, having driven Edward and his army out of his kingdom, invaded England, laying waste the country with fire and sword to the very walls of York. Ripon suffered in the general devastation, the houses having been destroyed by fire, and most of its inhabitants put to the sword. No sooner, however, had the victorious career of Edward III. freed the country from the invaders, than it was restored to a prosperous condition, principally through the exertions of the archbishop of York, and the liberality of the neighbouring gentry, many of whom fixed their residence here. Since that time Ripon has been occasionally honoured by royal visits. Henry IV. retired hither, with his whole court, in 1405, when the plague raged in London. In the year 1604, a similar cause occasioned the removal of the lord president's court from York to this town.

Ripon first sent members to parliament in the 23d year of Edward I., but this privilege was soon after discontinued, and was not revived till the reign of Edward VI. The patronage of the borough is vested in Miss Laurence, of Studley-Royal, who possesses all the burgage tenements to which the right of election is attached. The number of voters is 146, and the mayor is the returning officer. The corporation, by virtue of a charter granted by king James I., and since confirmed, and, in some degree, extended, by

succeeding monarchs, consists of a mayor, recorder, 12 aldermen, 24 assistants, a town-clerk, and other inferior officers. Ripon was formerly celebrated for its manufacture of spurs, which were, indeed, so highly esteemed, that it became a proverbial expression to say "As true steel as Ripon rowels," when speaking of a man of fidelity, honesty, or intrepidity. The manufacture of woollens likewise flourished here, in former times, but this branch of business is now completely decayed. The archbishop of York has his court and prison here for the liberty of Ripon. On the nomination of the archbishop, and by his majesty's commission, justices are appointed, who, in conjunction with the mayor and recorder, hold sessions for the town and liberty. The dean and chapter of Ripon minster have likewise a prison here, and hold a court for the decision of causes arising within their manor. The market day here is Thursday; and there are fairs on Thursday after 13th January, 12th and 13th May, first Thursday in June, first Thursday after 22d August, and 22d November. The market-place is a handsome and spacious square, surrounded by well-built houses, and having in the centre an obelisk 90 feet high, erected, in 1781, by William Aislaby, esq. of Studley, who represented this borough in parliament during the long period of sixty years. Here also stands the town-hall, built in 1801, from designs by Mr. Wyatt, and at the expence of the late Mrs. Allanson of Studley. A theatre was erected here in 1792, by the late George Hallell, esq. The free-grammar school was founded by king Edward VI., and was finished, and amply endowed, by his successor, queen Mary, in 1553. The other public establishments belonging to the town are, a dispensary, Sunday schools, a school of industry, and four hospitals, *viz.* that of St. Mary Magdalen, for six poor women; of St. John, a small building, appropriated to two poor women; St. Anne, which supports eight women; and Jepson's hospital, in which twelve poor boys are maintained, clothed, and educated. This hospital was founded, in 1672, by Zacharias Jepson, a citizen of York.

The monastery, previously mentioned as the probable nucleus which gave rise to the town, appears to have been of considerable celebrity. After the destruction of the original buildings in the reign of Alfred, king of Northumbria, it was re-erected in a style of more magnificence than was usual in that age, by the famous Wilfrid, archbishop of York. William of Malmesbury mentions the new structure as remarkable "for its curious arches, its fine pavements, and winding entries." The same author says it was much resorted to by the northern nobility, and was endowed with very extensive possessions. The memory of St. Wilfrid is still honoured by an annual feast and procession at this town. His monastery received extraordinary marks of royal munificence. The great king Athelstan granted to it many immunities, and particularly the privilege of sanctuary. From that period history records few particulars respecting this establishment, except its destruction by the Scotch in the reign of Edward II., when it ceased to be a monastic foundation. The church, however, was rebuilt and made collegiate by archbishop Melton, from whose time, till the reign of Henry VIII., it had seven prebends, with distinct revenues, attached to it; besides nine chantries within the church, which were dissolved by Edward VI. King James I. renewed the collegiate privileges of this church, by the establishment therein of a dean and six prebendaries, to whom he granted "divers lands, prebends, chantries, and rectories, belonging to the said church before the dissolution." In 1607 the same monarch added a subdean, and thus completed the college as it still exists.

Ripon church is dedicated to St. Peter and St. Wilfrid, and has, attached to it, a peculiar jurisdiction, under the archbishop of York. The king is patron of the deanery; and the subdean is nominated by the dean from among the prebendaries. When a vacancy occurs in the number of the latter, the dean and chapter present three persons to the archbishop, who collates one of them. As a building, this church has considerable claims to the notice of the antiquary, though its appearance has been much injured by additions and alterations executed at different periods and in different styles of architecture. Its general form is that of a cross, having two uniform square towers, each 110 feet high, at the west end, and a third, called St. Wilfrid's great tower, in the centre of the transept. From the last, there formerly rose a very noble spire, which was blown down Dec. 8th, 1660.

The sepulchral monuments in the church are too numerous to be mentioned in detail. There are many in commemoration of different branches of the principal families in the neighbourhood, especially the Blackets; the Kitchenmans; the Riddales; the Wanleys; the Oxleys; the Nortons, of Sawley; the Weddels, of Newby; the Mallories and Aislabies, of Studley; and the Markenfields, of Markenfield. Among these may be noticed a beautiful monument to the memory of W. Weddel, esq. the design of which was taken from that curious relic of antiquity, the Lantern of Demosthenes, at Athens. An altar-tomb, of grey marble, situated in the fourth aisle of the nave, is said to commemorate an Irish prince, who died at Ripon on his return from the Holy Land. On the entablature are represented the sculptured figures of a man and a lion in a grove of trees.

The environs of Ripon are rich, fertile, well wooded, in a high state of cultivation, and interspersed with villages, and seats of the nobility and gentry. Among the latter the principal are, Studley-Royal, and Newby-Hall. The first is the property of Miss Laurence, and is situated at the distance of nearly three miles S.W. from Ripon. The house is commodious and elegant, and contains many excellent pictures, and portraits by the best masters. But the chief objects of attention here, are the park and pleasure-grounds, which are generally ranked among the finest in England. The park, which is situated nearest the house, is diversified with gentle swells and declivities, and is adorned with ranges of lofty trees. The entrance to the pleasure-grounds displays a mass of the most luxuriant foliage, and the widely extended plantations which compose them, are judiciously varied, and finely adapted to the different situations. On one hand the hills gradually ascend with tufts of shade, interspersed over the verdure; on the other side they precipitately rise with lofty woods covering their brows, below which the rivulet, in one place, glides with a silent stream, and in another falls in cascades. Near the entrance is a building, called the Cold Bath, which is constantly supplied by a spring of pure water. Adjoining is the figure of a dying gladiator, and further on is a fine rustic bridge with the river rushing through it, and the back-ground so darkened by trees as to excite the idea of a cascade foaming through a cavern. Near this is a statue of Hercules destroying Antæus. The view now opens with a beautiful assemblage of new objects, most charmingly diversified. From a little grotto not far distant a fine expansive lake is seen winding round the base of an eminence, called Tent Hill, encircled by a magnificent amphitheatre of hanging wood. The lawn is laid out with exquisite taste, and here the water divides itself into various and beautiful forms, embellished at different points by statues of Neptune, Bacchus, Galen, a dying gladiator, and Roman wrestler. On rising grounds are situated a

temple of Piety, a Chinese temple, a temple of Fame, a banquetting-house, and various other ornamental buildings.

Near Studley-Royal are the venerable ruins of the once celebrated Abbey of Fountains, which was founded in the year 1132, for the monks of the Cistercian order, but soon afterwards suffered total demolition by fire. It was rebuilt, however, in 1204, in the early pointed style of architecture, which then began to prevail; this house continued to flourish till the general dissolution in the reign of Henry VIII., when its annual revenues, according to Speed, were valued at 1073*l.* or 7½*d.* This abbey, with all its offices and appendages, covered about twelve acres of ground. The church, the walls of which are still almost entire, appears to have been a very large and magnificent structure. The nave, in particular, is a most majestic specimen of building, uniting simplicity with lightness and elegance. The Ancient and Modern History of the Loyal Town of Rippon, by Thomas Gent of York, 8vo. 1733. History of Ripon, 12mo. 1801. Beauties of England and Wales, vol. xvi., by John Bigland. Drake's Eboracum, folio.

RIPOSTE, in the *Manege*, is the vindictive motion of a horse that answers the spur with the kick of his foot.

RIPOUR, in *Geography*, a town of Hindoostan, in the circar of Gohud; 40 miles S.S.W. of Gwalior.

RIPPACANOT CREEK, a river of America, near the western branch of the river Wabash.

RIPPERDA, JOHN WILLIAM, in *Biography*, baron of, was born in 1680, of a noble family, in the province of Groningen. He was educated in the principles of the Catholic religion, but upon marrying a Protestant heiress, he conformed to the Protestant faith. He appears to have entered the army while he was young, and for some time he was in the service of the States-General as colonel of the infantry, which post he occupied in the year 1715, when he was sent from the States to the court of Spain, to negotiate a commercial treaty. Having ingratiated himself with the king, Philip V., he returned to the Catholic religion, and took up his abode at Madrid. His first wife being dead, he married, in 1721, a Castilian lady of high birth, and rapidly rose in the confidence of the king. In 1725 he was sent to Vienna to negotiate an accommodation with the imperial court. In the same year he signed a treaty at Luxembourg with the emperor's plenipotentiaries; and on his return to Madrid he was created a grandee of the third class, and duke of Ripperda. He also obtained the office of secretary of state for foreign affairs; and the management of the war, marine, and financial departments, was entrusted to him, so that he had all the power, without the name, of prime minister. In a short time he was not only dismissed from his employments, but confined in the castle of Segovia, where he remained two years, when, having found means to make his escape into Portugal, he passed from thence into England, where he remained till 1730, when he went to the Hague, and resumed the Protestant religion. After this he formed a connection with an envoy from Morocco, and in 1731 embarked for that country. He was favourably received by the sovereign, Muley Abdallah, to whom he proposed a scheme of uniting the Barbary states against Spain, and of invading that country. He engaged the Moors to undertake the siege of Ceuta, and having declared himself a convert to the Mahometan religion, and assumed the name of Osman, he was nominated to the chief command of the army employed for that purpose. By his military talents he inspired the Moors with confidence in their enterprise, when the arrival of a Spanish army in Africa, which laid siege to Oran, disconcerted his plans. Nevertheless, he persisted in the siege of Ceuta,

Ceuta, and defeated the garrison which had fallen out against him. But a nocturnal surprise of the Moors in the trenches broke up the siege, and Ripperda, who fled in his shirt to Tetuan, was received so coldly at the court of Morocco, that he meditated an escape to some other country. He was stopped by the emperor, and fully expected to pay the forfeit of his life, on account of his success; but he pleaded his cause with so much effect, that he was, after a short imprisonment, set at liberty. He now formed a new project, which was a consolidation of different religions, especially the Mahometan and Jewish, which he endeavoured to render compatible by admitting the prophetic character of Mahomet, and inculcating the expectation of a future Messiah. He made some converts to his opinions; but at length became suspected of dishonest motives, and was obliged to retire. His projecting spirit continued to the last, and he advanced considerable sums to Theodore for his attempts on the crown of Corsica. He died at Tetuan, in 1737. *Universal History. Gen. Biog.*

RIPPERS, in the *Wire-works*, are the people who attend in the mills, take the prepared small rods of iron, and work at the barrels where they are drawn into wire.

RIPPIN, or RUPULAM, in *Geography*, a town of Hungary; eight miles N.N.E. of Leopoldstadt.

RIPPINICA, a town of the duchy of Warfaw; 25 miles N. of Wladislaw.

RIPPLE, in *Agriculture*, a slight scratch or tear, sometimes applied to very slight ploughings, hence called ripplings.

RIPPLE, in *Rural Economy*, an implement of the comb kind, constructed with several upright triangular prongs, set near together in a strong piece of wood, for the purpose of rippling flax and hemp.

RIPPLING, in *Sea Language*, a broken and interrupted noise, produced by a current on or near the sea-coast.

RIPPLING of *Flax*, in *Rural Economy*, the operation of taking off the seed from the flax by drawing it through a ripple or large comb. See *FLAX*, and *RIPPLE*.

RIPPON, in *Geography*. See *RIPON*.

RIPRAPPS, a narrow shoal in the English channel, between Folkestone and Boulogne, S.W. and N.E. about 10 miles; with a strong bottom, and at a low spring-tide not covered above 14 feet with the sea.

RIPRESA, Ital., the same as *reprise* in French, and *repeat* in English; which see.

RIPSA, in *Geography*, a town of Sweden, in Sudermanland; 13 miles N. of Nykoping.

RIPTON, a township of America, in the county of Addison and state of Vermont; containing 15 inhabitants.

RIQUEVILLE. See *RICHENVEIR*.

RIQUEURIA, in *Botany*, a name in the Flora Peruviana, destined to commemorate Lewis Riqucur, apothecary to king Philip V. of Spain. *De Theis*.

RIS, in *Geography*, a town of France, in the department of the Puy-de-Dôme, near the Allier; nine miles N. of Thiers.

RISACO, a town of Dalmatia, in the bay of Cataro; 20 miles N.N.W. of Ragusa.—Also, a river of Istria, which runs into the gulf of Trieste, about three miles from Capo d'Istria.

RISARD, FRANCIS, in *Biography*, a French mathematical writer in the eighteenth century, published several esteemed elementary works for the instruction of the young in the sciences. He was a native of Neufchateau, in Lorraine, and was made professor of philosophy in the college of Beauvais; he died at Paris in the year 1778. His pro-

ductions consist of "Elements of the Mathematics," in 4to., of which the author published an abridgment, in 8vo.; "A Treatise on the Sphere," in 8vo.; "A Treatise on Gnomonics," in 8vo.; "Tables of Sines," in 8vo.; "Rectilinear Trigonometry," 8vo.; "Elements of Geometry," in 4to.; and "Institutiones Philosophicæ," in 2 vols.

RISBOROUGH, or PRINCE'S RISBOROUGH, in *Geography*, a market-town and parish in the second division of the three hundreds of Aylesbury, county of Buckingham, England, is situated at the distance of 5 miles S.W. from Wendover, and 37 N.W. from London. The right of holding a market was granted to the inhabitants by king Henry III., who, at the same time, bestowed upon the townsmen many privileges. The market day is Saturday, weekly; besides which there is an annual fair on the 6th of May. The manor here was anciently vested in the families of Gifford and Humet; but having subsequently become vested in the crown, it was granted to Richard, earl of Cornwall, and king of the Romans, who died in 1272. It was afterwards the property of Edward the black prince, who is said "to have had a palace here, supposed to have stood within the site of a spacious moat, now dry, which is in a field adjoining the church-yard." In the reign of Henry V. this manor was assigned to his queen, Catharine, in dower. Charles I. sold it to certain citizens of London, who, in 1637, conveyed it to the family of the Chibnalls; one of whom gave a considerable sum of money to the parish to supply clothing annually to 24 poor women. Since the Chibnalls, it has been occupied successively by the families of Abraham, Adeane, Pelham, Panton, and Grub, the present possessors. According to the parliamentary returns of 1811, this parish contains 324 houses, and 1644 inhabitants.

Adjoining to Prince's Risborough is the village of Monk's Risborough, at which place, it is said, there was formerly a cell of Benedictine monks, subject to the monastery of Christ-church, in Hampshire. The church here is a handsome building, in the later pointed style of architecture, and contains many monuments. *Lysons's Magna Britannia*, vol. i. Bucks, 4to.

RISBY, a town of Sweden, in the province of Finland, near the gulf of Bothnia; 32 miles N. of Bjorneborg.

RISCHEBACH, a river of Saxony, which runs into the Elbe, near Wittenberg.

RISCHIN, a town of Bohemia, in the circle of Rakonitz; 30 miles S.E. of Rakonitz.

RISCLE, a town of France, in the department of the Gers; six miles S. of Nogaro.

RISCUS, among the Romans, sometimes signifies a chest or trunk covered with skins; sometimes it is used for a hamper, made of twigs or rushes to hold lint; and sometimes for a hollow place in the wall of a house, used likewise for holding lint, or the like.

RISEBERGA, in *Geography*, a town of Sweden, in the province of Skone; 28 miles N. of Lund.

RISENBURG, a town of Prussia, in the province of Oberland; 12 miles E. of Marienwerder.

RISENKIRCH, a town of Prussia, in the province of Oberland; 14 miles E. of Marienwerder.

RISENTITO, in the *Italian Music*, a brisk, lively, or expressive manner of playing.

RISHI, in *Hindoo Mythology*, is a general name for ancient sages or saints. Considerable difficulty occurs in determining, with any exactitude, who they were, whether they had any historical existence, or are merely the crea-

tures of the imagination. Seven of them are most frequently spoken of; by some said to be the first rational beings created by Brahma. Each has a wife, and a numerous offspring. The names of these seven differ in different authorities; but the following list is that usually received. 1. KASYAPA; 2. *Atri*; 3. VASISHITA; 4. VISWAMITRA; 5. Gautama or GODAMA; 6. JAMADAGNI; 7. *Bharadvaja*. (The names distinguished by capitals have furnished articles in this work.) The wives of these patriarchs have been transferred to the heavens, and are the stars called by western astronomers the Pleiades; by the Hindoos, KRITKA, under which word will be found some information respecting them, shewing that the astronomical fabulists of both races have common legends. The Rishis are said to be the bright stars in the great bear. How they became so distant from their sparkling spouses is explained in the article just referred to. In several languages of India, a bear is called Rish; and there may be some allusion both to the constellation and the fages in question. Sometimes the seven Rishis, and the seven Menus, are confounded. (See MENU.) Another race of patriarchal fages is also sometimes confounded with both. These are the Munis. See MUNI; in which article the reader is requested to correct a typographical error, in the second column, third line from bottom, for *many-mothered*, for, read *many-mothered son*. Jamadagni, for instance, is usually called a Rishi; yet in our article given under the name of his wife, RONEKA, he is, on Puranic authority, called "a great Muni." The Rishis, as the immediate production of Brahma, are sometimes called Brahmadikas, of whom likewise there are seven; but they are not usually supposed to be the same with the Rishis: some lists have no names in common with those of the Rishis; others have several. As the production of Brahma, there is another set of seven beings of different names from any of the above-named lists, but employed in early days in peopling the world; these are called Sanakadikas, of whom something is said under the name of their principal, SANAKA. The Hindoo books differ very much in their accounts of these varieties of persons interposed between the Supreme Being and the created world; and it is not easy, if at all practicable, to reconcile their disagreements; nor perhaps worth the pains were it otherwise.

We shall not attempt to notice the disagreements, that could be picked out from high Hindoo authorities, respecting the equivocal personages named in this article. It may be briefly observed, that although the seven Rishis are very commonly adverted to, the appellation is by no means confined to that number. In the Siva Purana, Brahma is said to have produced Brighu and the seven Rishis, and after that Nareda, from his thigh, Kardama the Rishi from his shadow, and from the fore-finger of his right-hand, Daksha. These persons are sometimes called Rishis, Brahmadikas, Maharshis, Devarshis, &c. A fage of the name of Dadichi occurs in the Skanda Purana, as having swallowed the sacred books, for their security, at a period of great wickedness and tumult. He is called a Rishi; as is another named Uddalaka, who was half betrothed to Lakshmi, the goddess of wealth; but espoused her sister Jyeshtha, goddess of poverty. These allegories may be explained. (See UDDALAKA, and KARDAMA.) Other Puranas seem to identify in some parts the Rishis and Munis, calling both "the virtuous fages, who delight in protecting the people." In other parts distinctions are made. In the beginning of this article we have stated the term Rishi to be, as it were, generic; meaning fages, saints, patriarchs. This seems authorized by the Ramayana, where this note occurs.

"There are four kinds of Rishis, or fages; the Rajarshi, or royal fage; the Maharshi, or great fage; the Brahmarsi, or sacred fage; and the Devarshi, or divine fage. Of these the first is esteemed the lowest, and the last the highest." These appear to be the specific varieties. In addition to the articles already referred to, some farther points connected with the subjects of this will be found noticed under the following: MAHARSHIS, MATSYAVATARA, PIKESWARI, PITRIS, PULAHIA, PULASTYA, RAJARSHI, RAVENA, RONEKA.

RISIBILITY, the faculty of *laughter*; which see.

Risibility is commonly supposed an attribute peculiar to man; as being the only creature capable of judging what is ridiculous.

Some philosophers go so far as to assert, that the degree of judgment is always seen in that of laughter; fools always either have too little or too much of it.

Authors do not agree as to the peculiar mechanism in man, by which laughter is raised. It is usually attributed to the communication between the plexus nervosus, and the diaphragmatic nerves. See LUNGS.

RISIGALLUM, in the *Materia Medica*. See REALGAR.

RISING, in *Astronomy*, the appearance of the sun, a star, or other luminary, above the horizon, which before was hid beneath it.

By reason of the refraction of the atmosphere, the heavenly bodies always rise before their time; *i. e.* they are seen above the horizon, while they really are below it. See REFRACTION of the *Atmosphere*.

There are three poetical kinds of rising of the stars. The *Acrenychal*, *Cosmical*, and *Heliacal*; which see respectively.

To find the rising, &c. of the sun and stars by the globe, see GLOBE.

RISING, in *Rural Economy*, a term sometimes applied to yeast, or barm used for the purpose of fermenting different matters.

RISING, in *Ship Building*, a term derived from the figure of a ship's bottom in general, which gradually narrows or becomes sharper towards the stem and stern-post. On this account it is that the floors, towards the extremities of the ship, are raised or lifted above the keel; otherwise the shape would be so very acute, as not to be obtained from timber with sufficient strength in the middle or cutting-down. The floor-timbers forward and abaft are therefore gradually lifted or raised upon a solid body of wood, called the *dead* or *rising-wood*, which must of course have more or less rising as the body of the ship assumes more or less fullness or capacity.

RISING of *Boats*, is a narrow strake of board fastened withinside to support the thwarts.

RISING-Floors are the foremost and aftermost floors, which, on account of the rising of the body, are the most difficult to be obtained, as they increase in the acuteness of shape; and to preserve strength in the throat, the cutting-down must be deeper.

RISING-Line, an elliptical line drawn in the plan of elevation, by which line, with its corresponding half-breadth or narrowing line, the figure of the bottom near the floor-heads is determined.

RISING-Square, a square used in whole moulding, upon which is marked the height of the rising-line above the upper edge of the keel.

RISING-Straight, is a curve line used in whole moulding drawn in the sheer plan, at the intersection of the straight part

part of the bend mould, when continued to the middle line at each timber.

RISING-WOOD, that part of the basis of a ship's body, forward and abaft, which is formed by solid pieces of timber scarfed together lengthwise on the keel. The rising-wood must be sufficiently high to seat the floors; and afore and abaft the floors, it is continued up to the cutting-down or upper side of the floors, for the purpose of securing the heels of the cant-timbers, and there left sufficiently broad to admit of a stepping or rabbit for the heels of those timbers, that they may not be continued downwards to sharp edges.

RISK, or **RISQUE**, the hazard or chance of a loss, damage, &c.

There is a great risk run in letting goods go upon credit to great lords, wives not authorized by their husbands, and young people not yet arrived at the age of majority.

Skinner derives the word from the Spanish *risco*, *steep*; Covarruvias, from *risco*. In the barbarous Greek, they say, *ῥιζαζεν*, for *periclitator*, *I hazard*; and *ῥιζος*, for *lot* or *chance*; which words, as well as *risque*, Skinner thinks, may be deduced from *ῥιζω*, for *αναριπτω τον κωπον*, *I cast the dye*.

To prevent any risk in invoices of merchandizes by sea, it is usual to insure them.

Accordingly the risk is a subject of primary consideration in cases of marine insurance. All the risks or perils, that are incident to sea-voyages, may be provided against by insurances, with certain exceptions founded on public policy and the interests of humanity. Thus, the insurer can, in no case, upon principles of natural justice, make himself answerable for any loss or damage, proceeding directly from the fault of the insured. No insurance can be made, even against the perils of the sea, upon illegal commerce. In most foreign countries, insurances on the lives of men are prohibited. In France they have been always deemed illegal, and are expressly forbidden by the ordinance of Lewis XIV.; nevertheless, French writers have held that this does not apply to Negro slaves. According to Valin, who has, by curious reasoning, attempted to vindicate this doctrine, the disposition to suicide is natural in Negro slaves, and imputable, as he expresses himself, to the "inherent vice of the article;" and, therefore, their death, proceeding from this cause, must be deemed natural death. But the killing of them, or the throwing of them overboard in a revolt, is a loss incident to this trade, and a peril within the policy. It is to be lamented, that, whilst the slave trade was countenanced and carried on in this country, the objects of this cruel traffic have been too much considered as mere merchandize; and the insured upon this trade formerly recovered, under the common policy, for any loss sustained in the voyage by the mortality of the slaves, whether they were thrown overboard, in cases of supposed necessity, or died a natural death, or perished by the perils of the sea. The legislature, however, while this infamous and savage traffic subsisted, interposed, and by an annual act, passed with a view to *interest* the persons concerned in this trade in the preservation of the lives and health of the slaves, declared, that though the policy remained in the same form as before, it cannot protect the insured against losses occasioned by natural death, ill treatment, throwing overboard, or by restraints of princes proceeding from attempts to get slaves by force. (See stat. 30 Geo. III. c. 33. § 8. 34 Geo. III. c. 80. § 10. and 39 Geo. III. c. 80. § 24.) But we trust the provisions of these and similar statutes are become wholly unnecessary in this country, and that the trade, of

which we shall give some account in its proper place, is abolished never to revive.

The words of an English policy, which specify the various risks against which insurances are usually made, are these: "Touching the adventures and perils which we, the assurers, are contented to bear, and do take upon us in this voyage, they are of the seas, men of war, fire, enemies, pirates, rovers, thieves, jettisons, letters of mart and countermart, surprizals, takings at sea, arreists, restraints, and detentions, of all kings, princes, and people, of what nation, condition, or quality soever; barratry of the master and mariners; and of all other perils, losses, and misfortunes, that have or shall come to the hurt, detriment, or damage of the said goods and merchandizes, and ship, &c. or any part thereof, without prejudice to this insurance." The latter clause seems to be sufficiently comprehensive to embrace every species of risk to which ships and goods are exposed from the perils of sea-voyages. However, by the agreement of the parties, the general words of the policy may be altered or qualified; and any of the risks may be wholly or in part excluded, and the insurance may be made only against some particular risks, or up to, or beyond certain degrees, or upon particular articles. In England, it is now constantly stipulated in all policies, that upon certain enumerated articles of a quality peculiarly perishable, the insurer shall not be answerable for any partial loss whatever; that upon certain others, liable to partial injuries, but less difficult to be preserved at sea, he shall only be liable for partial losses above *five per cent.*; and that, as to all other goods, and also the ship and freight, he shall only be liable for partial losses above *three per cent.* This stipulation is made by a memorandum, in the form of a warranty, inserted at the bottom of all English policies. It was first introduced here about the year 1749; before which time the insurer was liable for every injury, however small, that happened to the thing insured. This clause prevented the necessity of adapting the premium to the nature of the commodity. Nevertheless our policies indemnify the insured against every loss, let it be ever so inconsiderable, arising from any cause affecting the general safety of the ship and cargo. Losses of this sort, being of the nature of "general average," are so called in the memorandum; and there is, therefore, annexed to each of the provisions above-mentioned, an exception of general average. In the policies of private insurers, the case of the "stranding of the ship" is likewise excepted. In the common policies, used in London by private underwriters, the memorandum runs thus: "Corn, (comprehending every sort of grain, and also pease and beans,) fish, salt, (excluding salt-petre,) fruit, flour, and seed, are warranted free from average, unless general, or the ship be stranded: sugar, tobacco, hemp, flax, hides, and skins, are warranted free from average, under *five per cent.*; and all other goods, also the ship and freight, are warranted free from average, under *three per cent.*, unless general, or the ship be stranded."

This form of the memorandum was generally used, not only by private underwriters, but also by the two insurance companies, from its first introduction in 1749, till the year 1754; when, in consequence of a particular case that occurred, the London Insurance Company left out of the memorandum in their policies the words, "or the ship be stranded;" and the same alteration was soon after adopted by the Royal Exchange Assurance Company. Private underwriters have, however, continued the memorandum in the old form. Many questions have arisen as to the true meaning of the words, "free from average, unless general,

or the ship be stranded." The word "unless" has been held to make an *exception*, and not a *condition*; and cases have occurred in which judges of the highest eminence have put a different construction upon the fore-mentioned clause. It is now settled, that if the ship be stranded, the insurer is liable for any partial loss in any of the articles in the memorandum, though such loss did not arise from the stranding, but from some other cause. Notwithstanding the number of cases, which have been decided upon the construction of the memorandum, it still remains a question, whether the partial losses, from which the insurer is exempted by it, comprehend the *total loss* of an *entire individual*, as well as a partial injury to the *whole* of the species of goods exempted by the memorandum from small average losses; as, *e. gr.* if out of 101 hogheads of sugar of equal value, five are so completely spoiled in the voyage, as to be worth nothing, and therefore *totally lost*. If this loss be calculated upon the whole 101 hogheads, it will not amount to *five per cent.* In such a case, it has been thought, that the insurer would be protected by the memorandum, and not liable for the loss. But the question has not been decided.

There are certain injuries or losses, to which goods on ship-board are liable, that do not arise from the perils of the sea; and for these the owners are liable. These may be owing to some fault or defect of the ship: in this case the insurer is not liable, because, in every contract of insurance, there is an implied warranty, that the ship is sea-worthy; and if it appear otherwise, the contract is void. In many cases, the master also, as well as the owners, is answerable. He is bound to deliver goods in the same state in which he received them; and of course he, as well as the owners, is liable for all loss or damage not proceeding from some inevitable misfortune. They are answerable for loss or damage occasioned by bad stowage, wet, theft, embezzlement, rats, &c. This is the rule of the marine law, and agrees with the common law. At common law, the owners and master were liable to the full value of the goods lost; but now by 7 Geo. II. c. 15. they shall only be liable to the value of the ship and freight for any act done by the master or mariners. The master's liability, and that of the mariners, remains the same. But as this provision only extended to the case of embezzlement, &c. by the master or mariners, it did not afford a sufficient protection to ship-owners. Therefore the 26 Geo. III. c. 86. limits the liability of the owners to the value of the ship and freight, though the master or mariners should not be privy to such robbery, &c.; and they are exempt from all liability for any loss by fire. But though the owners are responsible to the amount of the value of the ship and freight, for losses occasioned by external thieves; yet, under the policy, the insurers are also liable; and, therefore, in such cases, the proprietor of the goods, or the insurers in his name, may recover against the owners.

In order to charge the insurer, the loss must happen during the continuance of the risk. This brings under consideration a subject of importance. Every voyage insured must have a fixed commencement and termination. It is proper, therefore, to inquire what is the duration of the risk, with reference to insurances upon *goods*, upon the *ship*, and upon *freight*. In France, and most other countries, it is provided, that if the time of the risk be not regulated by the contract, it shall commence, as to *goods*, from the time they are put on board the ship, or put into barges, to be conveyed on board, that is, from the moment of their leaving the shore; and it continues till they are safely landed at the place of their destination. It is alleged, that the perils of

the sea commence from the moment in which the goods are on the water. In our policies, the words usually employed to express the commencement and end of the risk on *goods* are these: "Beginning the adventure upon the said goods and merchandize *from the loading thereof aboard the said ship*, and so shall continue and endure until the said ship, with the said goods, shall be arrived at — (her port of delivery), and until the same be discharged and safely landed." With us, therefore, the risk does not commence until the goods are actually on board the ship; and, therefore, the insurer is not answerable for any loss or damage which may happen to them, while they are on their passage to the ship. And it may be laid down as a general rule, that the risk on goods continues no longer than they are actually on board the ship mentioned in the policy; and that if they be removed from on board that ship, and landed, or put on board another ship, without the consent of the insurers, the contract is at an end, and the insurers are discharged from all subsequent responsibility.

To this rule, however, there are several exceptions: as where the ship is disabled, and the goods are put on board another vessel, to be forwarded to their port of delivery; so, if it be agreed, that the goods shall be removed into another ship, at a particular place in the voyage, and no ship being there, they are put on board a store-ship. The insured is protected by the policy in carrying the goods in lighters to any part of the port of delivery, where such goods are usually landed. It is a general principle, that policies ought to be construed according to the usage of trade; and in doubtful cases, in favour of the insured. Although the general rule is, that the insurance on goods shall continue "till they are discharged and safely landed," yet it has been holden by a very eminent and learned judge, that if the insured take goods from on board the ship in his own lighter, the insurer is discharged. Where goods are put into a public lighter, for the purpose of being landed, the risk continues; but if the merchant send his own lighter, this will be a delivery to him, and the insurer is discharged. Although the risk on goods, according to the usual words of the policy, is to continue till they are discharged and safely landed at the port of delivery, this is not to be understood as an authority for prolonging the risk, after the ship's arrival at her port of delivery, for any indefinite length of time, at the pleasure of the insured; but the fair construction of the clause is, that the goods shall remain under the protection of the policy for a *reasonable time*, till they can be conveniently landed, and no longer.

As to the insurance of the *ship*, the risk, in some countries, is made to commence from the time she begins to take in her first goods, or ballast, and to continue till after she arrives at her place of destination, and is entirely discharged. In others, the risk is made to end twenty-one days after the ship's arrival, or sooner, if she be unloaded. In France, if the time of the risk on the ship be not regulated by the contract, it runs from the time she sets sail, till her arrival at her port of destination, and till she be there anchored and moored at the quay. In England, the commencement of the risk on the ship varies in almost every case. In outward-bound voyages, it is generally made to commence from her beginning to load at her port of departure. Sometimes privateers on a cruise, ships engaged in the coasting trade, or in short voyages, are insured for a limited period of time; and, in such cases, the risk commences and ends with the term, wherever the ship may then happen to be. If a ship be insured "*from*" the port of London to any other port, and before she breaks ground, an accident happen to her, the insurers are not answerable;

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for the risk does not commence till she sets sail on her departure from the port of London: but if the insurance be "at and from" the port of London, the insurers are liable for any accident that may happen to her, *from the time of subscribing the policy*. When a ship, expected to arrive at a certain place abroad, is insured "at and from" that place, or "from her arrival" there, the risk begins from the first moment of her arrival at the place specified; and the words "first arrival" are implied, and always understood in policies so worded. In such cases, the risk continues there as long as the ship is preparing for the voyage insured; but if all thoughts of the voyage be laid aside, and the ship be suffered to lie there for a length of time, with the owner's privity, the insurer is not liable; for this would be to subject him to the whim and caprice of the owner, who might choose to let the ship lie and rot there. In English policies, the risk on the ship is usually made to continue "until the ship hath moored at anchor twenty-four hours in good safety," and the insurer is answerable for no loss after the expiration of that time. If the ship, before the twenty-four hours are expired, be ordered to the proper place to perform quarantine, the risk continues, though she do not leave her moorings till long after the expiration of the twenty-four hours. Upon the same principle, if the ship, on her arrival at her port of destination, be subject to seizure under an embargo, and a declaration of reprisals, and she be in fact seized within the twenty-four hours, though she be permitted afterwards to load her cargo, the insurer is liable. The risk on the rigging, tackle, furniture, and provisions of the ship insured, continues no longer than they are attached to, or remain on board, the ship. But if it be necessary to put these articles on shore during a repair, which is the usual practice in such cases, the risk continues on them while on shore, and if they are lost or damaged by any of the perils mentioned in the policy, the insured is liable. An insurance upon an India voyage includes the risk of the country voyage by the usage of the trade, with which, in this and other instances, the underwriter is presumed to be fully acquainted. Thus an insurance was made on a ship "at and from Bengal to any ports or places in the East Indies, China, Persia, or elsewhere beyond the Cape of Good Hope, forwards and backwards, and during her stay at each place, until her arrival at London." In an action on this policy, tried before lord Mansfield, the plaintiff obtained a verdict. Upon a motion for a new trial, the court determined that, under all the circumstances, the plaintiff was entitled to recover. The reasons were, that the underwriters are presumed to know the course of the East India trade, the terms of the charter-party, and the destination of the India ships, (which are under the direction of the company and not of their owners): that the charter-party is a printed form of very long standing: that, besides the liberty thereby given, to prolong the ship's stay for a year, it is very common, by a new agreement, to detain her a year longer; for no ship comes home in ballast, and the longer a ship is kept, the more beneficial to the owners: that the words of the policy are adapted to this usage, being without limitation of time or place, and without any reference to the first voyage particularly mentioned in the charter-party: that the terms of the policy precisely describe the risk in its utmost latitude, and necessarily extend to every prolongation of stay, and every country voyage: that the usage of the India trade, and the course of the voyages in it, were notorious to insurers, who must be supposed sufficiently constant of them, and the obligation of the policy is taken from the usage, and the words of the charter-party, which refer to that usage, in the same manner as if it were expressly inserted in the policy; whereas if every person

insured should be obliged to state to the insurer all the grounds of his expectations, as to the ship's continuance in India, or her returning to England, it might produce great litigation and confusion in cases arising upon these policies: besides, it would be contradictory to the policy, to say that the underwriter did not insure for a country voyage.

If in a policy on an India voyage, there be liberty "to touch, stay, and trade at any ports or places;" this covers the risk, even of a second country voyage. In a like policy, the liberty was only to touch and stay at any port, &c. in the voyage, by the usage of the trade. This covered the risk on the intermediate voyages. Nevertheless, the general rule is, that a liberty to touch and stay at any ports and places, means only places in the usual course of the voyage. A liberty to touch and stay does not authorise the insured to break bulk and trade. If the voyage described in the policy has really been commenced, though at a time, and under circumstances very different from those which were in the contemplation of the parties at the time when the policy was effected; yet if there be no fraud, misrepresentation, or concealment on the part of the insured, this shall be a good commencement of the risk. Although the ship, through necessity, change the order of the places at which she is to touch, yet if she do not abandon the original voyage, the risk continues.

In an insurance upon freight, the risk generally begins from the time when the goods are put on board. If an accident happen to the ship before any goods are put on board, which prevents her from sailing, the insured cannot recover for the loss of freight, which the ship might have earned, if the accident had not happened; but if part of the cargo be put on board, and the rest be ready to be shipped, the insured may recover for the whole freight, upon a valued policy. If the ship be lost on her way to her port of loading, or to a distant place where she is to take in her cargo, the insurer is liable for the whole freight.

If, after the insurance is effected, any thing be done by the insured to alter the nature of the risk, this must be done with the consent of the insurers, otherwise it will avoid the contract. If a ship insured as a private trader afterwards takes letters of marque, without the consent of the underwriters, they are thus discharged, although no use be made of the letters of marque.

In connection with the subject of this article, we may add a few words on the loss, *i. e.* the injury, or damage, which may be incurred by those perils of the sea that constitute the risk, against which the insurer undertakes to indemnify the insured. This loss may be either total or partial; the total loss signifying, in a natural sense, the absolute destruction of the thing insured; but, in a legal sense, it means not only the total destruction, but likewise such damage to the thing insured, though it may specifically remain, as renders it of little or no value to the owner. A loss is also said to be total, when, in consequence of the misfortune that has happened, the voyage is lost, or not worth pursuing; or, if the value of what is saved be less than the freight, &c. A partial loss is any loss or damage not amounting to a total loss. Partial losses are sometimes denominated "average" losses, because they are such as are the subjects of average contributions; and they are distinguished into general and particular averages. These losses may be incurred by the perils of the sea, such as the ship's foundering, stranding, or striking suddenly against a rock, by running foul of another vessel, by fire, by capture, (see RECAPTURE and RANSOM), by arrest and detention of princes, by barratry, (see BARRATRY), by average contributions, by expence of salvage, or they may be wilful and fraudulent. The term *average*, derived from *averagium*, formed

formed from the verb *averare*, to carry, has been explained under that article. It is here used to signify a contribution made by the owners of the ship, freight, and goods on board, in proportion to their respective interests, towards any particular loss or expence sustained for the general safety of the ship and cargo; so as that the particular loser may not be a greater sufferer than the owner of the ship and the other owners of goods on board. This just and equitable contribution is called *general* or *gross* average, because it falls generally upon the whole or gross amount of the ship, freight, and cargo; and also to distinguish it from what is often, though improperly, termed *particular* average, but what, in reality, means a particular, and not a general loss, and has no affinity to average properly so denominated. The *petty* and *accustomed* averages are such as pilotage, towage, light-money, beaconage, anchorage, bridge-toll, quarantine, river-charges, signals, instructions, cattle-money, pier-money, digging the ship out of the ice, &c. When these petty charges are incurred in the usual course of the voyage, they are not considered as a *loss* within the meaning of the policy, but only a necessary and ordinary expence; but if incurred for any extraordinary purpose in the voyage, as to provide against any impending danger, or in consequence of the ship's being driven out of her course by stress of weather, they will then be deemed gross or general average, for which the insurer will be liable. A contribution upon a general average can only be claimed when the sacrifice, occasioning the loss, was, after due deliberation, found to be indispensably necessary for the preservation of the ship and cargo, whenever it appears to have conducted to this purpose, and when the ship and rest of the cargo were actually saved. If goods put into lighters to enable a ship to get up a river be lost, the rest shall contribute; but if the ship be lost, the goods in the lighters shall not contribute. It has been said that the wages and expences of the crew during the detention of a ship unjustly captured, as well as the charge of reclaiming her, and that the charges of wages, &c. upon a ship that is obliged to go into port to refit after a storm, should be brought into a general average. This point has never been decided in a court of justice, but the principle seems to have been allowed by judges of great authority in cases that have occurred.

No injury occasioned by mere sea-damage can be the proper subject of a general average: as if the ship be damaged in her hull or her rigging, the goods on board shall not contribute; also, if a ship spring a-leak in a storm, by which goods on board are spoiled, this is a simple damage, or particular loss, and cannot be the subject of an average contribution.

The rule with regard to average contribution seems to be, that the ship, freight, and every thing remaining on board that can properly be deemed a part of the cargo, shall be subject to this charge; and therefore money, plate, and even jewels, must contribute according to their value. But the persons on board, their wearing apparel, and also the jewels and ornaments belonging to their persons, shall not contribute; neither are seamen's wages liable to contribution. When the captain arrives at his port of destination, it is his duty to settle the contribution; and the average, if not settled before, should be paid before the cargo is landed: for the owners of the ship have a *lien* on the goods on board, not only for the freight, but also to *answer all averages and contributions* that may be due. If he neglect his duty in this respect, Mr. Serjeant Marshall conceives that an action would lie against him, or against the owners. If the loss was in money paid, an action on the case for money paid would unquestionably lie against each person bound to con-

tribute for his share; if in goods, a special action on the case, founded on the custom of trade, would lie against each person liable to contribute; or a bill in equity might be filed against them all. The mode of ascertaining each person's contribution, though not very accurately defined, is usually effected by ascertaining, after the ship's arrival at her port of discharge, the neat value of the ship, freight, and cargo, as if nothing had been lost; and valuing these at the price they would fetch in ready money at the port of discharge; and the neat amount, after deducting all charges, is the sum which is subject to the contribution; and each person's share of the loss will bear the same proportion to the value of his property, as the whole loss bears to the aggregate value of the ship, freight, and cargo. In England, some persons make the ship contribute for her full value and the freight; others, for half her value and one-third of the freight; and others, again, for half the value of the ship and freight; and she shall be valued at the price she was worth on her arrival at her port of delivery. The freight is valued at the sum the ship has earned on her arrival there.

As to the mode of valuing the jettison, it is now the settled practice with us to estimate the goods lost at the price they would have fetched at the port of delivery, on the ship's arrival there; freight, duties, and other charges being deducted. These contributions, under the general words of the policy, are a charge which the insurer is bound to pay; and it makes no difference whether the insured pay towards, or receive, this: he ought, in either case, to bear the proportion of the general loss, and that must fall on the insurers. For the loss by expence of salvage, see SALVAGE.

With regard to cases of wilful and fraudulent losses, the stat. 1 Ann. st. 2. c. 9. § 4 and 5. makes it a simple felony to destroy any ship, to the prejudice of the owners of the ship or goods on board; and takes away clergy, if committed on the high seas. And the 4 Geo. I. c. 12. extends this to the case of the owner or master who shall destroy any ship, to the prejudice of the owners of, or underwriters upon, goods. The 11 Geo. I. c. 29. takes away clergy from such offenders in all cases. See PIRATE.

In cases where the insured is entitled to call upon the insurer as for a total loss, he must "abandon;" that is, he must renounce and yield up to the insurer all his right, title, and claim to what may be saved, and leave it to him to make the most of it for his own benefit. The insurer then stands in the place of the insured, and becomes legally entitled to all that can be rescued from destruction. The idea of "abandonment," therefore, presupposes a total loss in this latter sense, and implies that something remains which may be saved, and which may be given up, or abandoned to the insurers. For if the insured could only abandon, in the case of a total loss, in the strict and natural sense of the words, there would be nothing to abandon, and abandonment would then be only an useless form. Some have said that the practice of abandoning dates its origin from the period when the contract of insurance itself first came into use; and yet it does not seem to be a right which necessarily results from the nature of the contract. It seems more probable that abandonment arose from the practice of occasionally introducing into policies particular stipulations, that if the thing insured should be spoiled, or greatly damaged, by any of the perils insured against, it should be abandoned to the insurers, who should be thereupon obliged to pay the entire sum insured; and that simply making good the damage should not be sufficient to discharge them: and such stipulations, being frequently introduced into the contract,

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tract, became at length the foundation of general rules, which have been established in some countries by positive law, and adopted in others as part of the general law of insurance. In the first case of abandonment, that came before lord Hardwicke in the court of chancery, in the year 1744, he determined that where a recaptured ship and cargo were sold to pay the salvage, the insured had a right to abandon the surplus, and claim as for a total loss.

By the law of insurance, as understood in England, the insured may abandon in every case, where, by the happening of any of the misfortunes or perils insured against, the voyage is lost, or not worth pursuing, and the projected adventure is frustrated; or where the thing insured is so damaged, as to be of little or no value to the owner; or where the salvage is very high; or where what is saved is of less value than the freight; or where further expence is necessary, and the insurer will not undertake, at all events, to pay that expence, &c. The ordinance of the marine of Lewis XIV. confines abandonment to the following five cases: capture, shipwreck, stranding, arrest of princes, or the entire loss of the effects insured. By the French law, the right to abandon seems to depend on the "species of misfortune" which has happened: with us, it depends rather on the "degree of loss" sustained in consequence of it. These general principles have been exemplified in cases comprehending losses by capture and arrest of princes, and also other losses. Capture, or arrest of princes, is, *primâ facie*, a total loss; and immediately upon the capture, or mere arrest, or at any time while the ship continues under detention, the insured may abandon, and give notice to the insurer of his intention to do so; and thus entitle himself to claim as for a total loss from the insurer. There is, however, this difference between a policy upon *interest*, and a *wager* policy, that, in the one case, the insured may, if he think proper, abandon the moment he has notice of a capture or detention; and this will bind the underwriters, whatever may be the ultimate fate of the ship. But in the case of a wager policy, there can be no abandonment, because the insured has nothing to abandon. Nevertheless, a capture or arrest does not necessarily terminate in a total loss: for if a captured ship be retaken, and permitted to proceed on her voyage, so that she suffers but a small temporary inconvenience, this would only be a partial, and not a total loss. Neither does a recapture necessarily deprive the insured of the right to abandon. The rule is, that if the thing insured be recovered before any loss is paid, the insured is entitled to claim as for a total, or a partial loss, according to the final event; that is, according to the state of the case at the time he makes his claim. But if, after a total loss has been actually paid, the thing insured be recovered, the insurer cannot oblige the insured to refund the money he has received; but he shall stand in the place of the insured: thus no injustice is done. Two cases are adduced to shew that, though a captured ship be recaptured, yet if the voyage be lost, the loss will be total, and the insured will have a right to abandon. In one case, a ship is taken and retaken, and sold in a distant country to pay the recaptors for the salvage, and the residue of the produce of the sales remains in the court of admiralty there; and in this case the insured may abandon, and recover as for a total loss. In the second case, a ship, after throwing part of the cargo overboard in a storm, and being disabled from proceeding on her voyage, till refitted, was captured, and her crew taken out; but, after being eight days in possession of the enemy, was recaptured, and carried into an English port; upon which the insured gave notice to abandon. Before the ship could

be refitted, the rest of the cargo was spoiled. This was a total loss, and the insured entitled to abandon. A title to restitution, arising from recapture, cannot take away a vested right to abandon, if the ship is unfit to perform the voyage. Serjeant Marshall observes, that he cannot find a single book, ancient or modern, which does not say that, in case of a ship *being taken*, the insured may demand as for a total loss, and abandon; and the proposition is proved more strongly by the general law which warrants him to abandon, in the case merely of arrest, or an embargo, by a prince not an enemy. If, indeed, the capture proves but a small temporary hindrance, the insured cannot abandon. The insured is in no case obliged to abandon; but he may abandon, if the voyage be defeated, or not worth pursuing: nevertheless he cannot, merely by abandoning, turn a partial into a total loss. It is not universally true, that because a ship has once been captured, the insured may abandon at any time afterwards. The rule is, that if the thing insured be recovered before any loss is paid, the insured is only entitled to a partial or a total loss, according to the final event. By the marine law, the property was not changed by the capture, till after condemnation; but since the 29 Geo. II. c. 34. the "*jus postliminii*" continues for ever. While the ship is in the hands of the enemy, she is considered as totally lost; yet the property is not changed, but reverts to the original owner, upon a recapture. But a recapture does not, in all cases, prevent the loss being total. If the voyage be absolutely lost, or not worth pursuing; if the salvage be very high; if further expence be necessary; if the insurer will not engage, at all events, to bear that expence, though it should exceed the value, or fail of success:—under these, and many other similar circumstances, the insured may disentangle himself, and abandon, notwithstanding a recapture. Upon a recapture, the property returns to the original owner, pledged for the salvage. Although there has at one time been a total loss, yet the insured cannot abandon, after the *final event* has determined it to be only a partial loss at the time of the action brought. There is no vested right to recover as for a total loss, till the insured, having a right to abandon, elects to do so. If the thing insured be recovered before the loss is paid, the insured can only recover according to the final event. If a ship be recovered after a long detention, it is not a total loss, even upon a wager policy. When the ship is safe, and the voyage is not lost, the insured ought not to be permitted to abandon. The insurer ought never to pay less than the value of the loss, nor the insured receive more. The insured can only recover an indemnity for his loss, at the time of the action brought, or offer to abandon. If, after a total loss has been paid, the ship be restored, the insured shall not be obliged to refund the money, and take the ship or goods. If, upon a recapture, the captain sell the ship and cargo, as being the best course to take for all parties concerned, the insured may abandon, and recover as for a total loss. If the captain purchase the ship from the captors, for account of his owners; the money paid, being in nature of a salvage, is only a partial loss.

There are other cases, besides capture and arrest of princes, in which the right of abandoning may be considered. Shipwreck is generally a total loss; but the mere stranding of the ship is not, of itself, deemed a total loss, so as to entitle the insured immediately to abandon. It is a rule that, to entitle the insured to abandon, there must have been, at some period of the voyage insured, or during the continuance of the risk, a total loss, and cases have occurred, from which it appears that no partial loss, however great,

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occasioned by the perils of the sea, can be turned into a total loss. But if the voyage be lost, from whatever cause, it is a total loss, not only of the ship and freight, but also of the cargo, if no other ship can be procured to carry it to its port of destination. If a cargo be damaged so as to be reduced in value to less than the freight, it will be a total loss.

Another circumstance to be here considered is the time within which the insured may abandon. In France, Spain, and Holland, the times are limited by law, according to the distance of the place where the loss happens, within which the abandonment must be made. In England no time is limited by law for abandoning; but our courts have laid down a rule, which seems better suited to the practice of commerce, and more likely to prevent frauds than those just alluded to. This rule is, that as soon as the insured has received advice of a total loss, he must make his election whether he will abandon or not; if he determines to abandon, he must give the underwriters notice of this "within a reasonable time" after the intelligence arrives; and any unnecessary delay in giving this notice will amount to a waiver of his right to abandon, for unless the owner does some act, signifying his intention to abandon, it will be only a partial loss, whatever may be the nature of the case, or the extent of the damage. When the insured has determined to abandon, and to demand as for a total loss, he is not obliged, as in some foreign countries, to make a formal protest, but merely to give notice of the loss to the underwriters, and of his determination to abandon. But there is no particular form for this purpose; in whatever form an abandonment is declared, it must be explicit, and it is not to be taken as matter of inference from an equivocal act. The notice may be given either to the underwriter himself, or to the agent who has subscribed for him. If the insurance be entire, the insured cannot abandon for part only; but if different articles be separately insured, or separately valued, any one of them may be abandoned. The abandonment must be simple and unconditional, otherwise it will not transfer the entire property to the insurers, which constitutes the essence of the abandonment. If, therefore, I abandon a captured ship, on condition that in case she shall be released, she shall continue my property, and I shall repay with interest the sum which the insurers shall have paid me, such an abandonment would be void.

As to the effect of an abandonment, we observe that it transfers the property insured to the insurers in proportion to their respective subscriptions; and this transfer relates back to the commencement of the voyage. As in England freight is insurable separately from the ship, the abandonment of the ship does not, as in France, transfer to the insurer the freight she has earned. Where the interest of the insured is not entirely covered by the insurance, he may abandon to the extent of the sum insured; for he is his own insurer for the residue. If goods be partly insured, and money borrowed on respondentia for the residue, the insurer will have the legal title to what is abandoned, and the lender only an equitable claim to his proportion. If there be three insurances; one on the ship and cargo, one on the ship only, and one on the cargo only; Emerigon thinks, that the insurers on the ship and cargo have an equal claim on the effects saved, with the insurers on the cargo only, and that they have a like claim on the freight, and the remains of the ship, with the insurers on the ship only, in proportion to their respective subscriptions; *e. g.* If a ship be valued at 5000*l.*, the cargo 5000*l.*, making a total of 10,000*l.*, and these are insured by different policies, thus:

On ship and cargo	-	-	£3000
On the ship only	-	-	3000
On the cargo only	-	-	3000
Uninsured	-	-	1000
			10,000

A shipwreck happens, and the net proceeds of the wreck of the ship are 500*l.*, and of the cargo 500*l.*, total 1000*l.*; Emerigon would adjust the claims of all parties thus:

To the owners for their part of ship and cargo uninsured,	-	-	£100
To the insurers on ship and cargo, a moiety of the produce of the wreck,	-	-	225
The like to the insurers on the ship,	-	-	225
To the insurers on the cargo, a moiety of the produce of the goods saved,	-	-	225
The like to the insurers on the ship and cargo,	-	-	225
			1000

By this adjustment the insurers on the ship and cargo would have a double share of the effects abandoned, which is manifestly unjust. An English merchant would, we conceive, adjust the different claims thus:

To the owners for their part of ship and cargo uninsured,	-	-	£100
To the insurers on ship and cargo, a moiety of three-fifths of the produce of the wreck,	-	-	150
To the insurers on the ship, three-fifths of the produce of the wreck,	-	-	300
To the insurers on the cargo, three-fifths of the produce of the goods saved,	-	-	300
To the insurers on the ship and cargo, a moiety of three-fifths of the produce of the goods saved,	-	-	150
			1000

The abandonment does not only entitle the underwriters to all that can be saved of the effects insured; but if compensation be made to the insured for the injury from which the loss arose, this compensation shall go to the underwriters; for when they have paid the loss, they, and not the insured, are the real sufferers.

If, after a total loss happening, the ship be abandoned, but she afterwards arrives safe, this shall not avoid the abandonment; but the insurers shall have all the profit of the voyage. But they cannot compel the insured to take back the thing insured and refund the money.

An abandonment once properly made upon a sufficient ground, and accepted by the insurers, is absolute and binding upon both parties; nor can it be revoked but by mutual consent; but if it be not upon sufficient ground, it will be void.

In case of misfortune, the insured is bound to use his endeavours to save as much as possible; and to enable him to do this, without prejudicing his right of abandonment, our policies make several provisions for certain acts to be performed for this purpose, without prejudice to the insurance, "to the charges of which, the insurers agree to contribute, each according to the rate and quantity of his subscription." The captain, in particular, is to exert himself to the utmost of his power in the preservation both of the ship and cargo; and for whatever is recovered of the effects insured, he is accountable to the insurers.

We shall here subjoin a few remarks on the adjustment of losses. In the adjustment of a loss, the first thing to be considered is how to ascertain the "quantity of damage" for which the underwriters are liable; and the next point to be settled is by what rule this shall be "appreciated." In order to ascertain the quantity of damage, the insured ought to know whether the loss be total or partial; if it be total, and the policy is a valued one, the insured is entitled to receive the whole sum insured, subject to such deductions as may have been agreed, by the policy, to be made in case of loss. On a valued policy, the value is admitted, and the insured has only to prove, if the insurance was on goods, that the goods valued were on board. Upon an open policy, it is necessary to prove the value of them, for which value (not exceeding the sum insured) the insurers are responsible. But in the case of a partial loss, the indemnity, secured by either sort of policy, is, that if the thing insured do not come safe to the destined port, but is lessened in value by damage received in the voyage, the loss shall be borne by the insurer. When the loss consists in the total loss of one entire individual parcel of the goods insured, and this is capable of a distinct valuation; as if, out of 100 hogsheads of sugar, 10 are lost, the insurer must pay the value of the 10. When a part of the goods insured is saved, and this exceeds the amount of the freight, the practice is to deduct the freight from the salvage, and to make up the loss upon the difference. But where the freight exceeds the salvage, then it is a total loss. Where the goods insured are damaged in the whole or in part, it is necessary to ascertain the quantity of such damage, by taking the value of the damaged goods from the prime cost, and the remainder will be the amount of the loss. If several articles be insured for one entire sum, but with a distinct valuation to each, and only one be put in risk; if that one be lost, the insured shall recover such a proportion of the sum insured as the value of the article bore to the value of the whole. If there be a clause in the policy, to be free of average from a particular risk, under so much *per cent.*, and a loss occasioned by that risk takes place, the proportion which the loss bears to the cargo must be calculated upon the cargo which was on board when the loss happened, not upon that which was on board at any other time.

In appreciating the loss, averages are settled according to the price of the articles at the time of settling. This is the rule of the Rhodian law, and of the laws of Wisbuy. In France, where almost all policies are valued, the insured has his election to fix the previous valuation, either at the prime cost, or at the current price at the time and place of loading. The same rule that applies to goods, applies also to the ship, which is always valued at the sum she is worth at the time of her departure, or at least at the commencement of the risk. Goods brought from a distance, may be valued at their improved price; but in France it is usually stipulated in the policy, that the ship shall remain of the same value during the voyage.

In England, if the policy be an open one, it is an invariable rule to estimate a total loss at the prime cost of the goods; that is, the invoice price, and all duties and expenses till they are put on board, together with the premium of insurance. A ship is valued at the sum she is worth at the time she sails on the voyage insured, including the expenses of repairs, the value of her furniture, provisions and stores, the money advanced to the sailors, and, in general, every expense of the out-fit, to which is added the premium of insurance.

A partial loss, upon either ship or goods, is that proportion of the prime cost, which is equal to the diminution

in value occasioned by the damage. And in a case which occurred with regard to a valued policy upon goods, it was determined that the diminution in value was that proportion of the value, in the policy, which the difference between the price of the found, and the price of the damaged, bore to the price of the found in the port of delivery. An insurer is never to be involved in the rise or fall of the market.

An adjustment being indorsed on the policy, and signed by the underwriters, with a promise to pay in a given time, is *prima facie* evidence against them, and amounts to an admission of all the facts necessary to be proved by the insured to entitle him to recover in an action on the policy. It is like a note of hand, and being proved, the insured has no occasion to go into proof of any other circumstance. An adjustment, however, may be impeached by shewing that the underwriter was induced to sign it by some fraud or concealment, or by some misconception of the law or fact. Marshall's Treatise on the Law of Insurance. See POLICY, RECAPTURE, and WARRANTY.

In matters of insurance, it is a maxim, that all is never to be risked on one bottom, or in the same vessel; to denote, that insurers must act with discretion in the signing of policies, and not hazard too much on each vessel; there being more to be expected from several than from one.

RISKUPITZ, in *Geography*, a town of Moravia, in the circle of Znaym; 9 miles W. of Krumau.

RISÖER, a sea-port town of Norway, in the province of Christianfand, on a peninsula projecting into the North sea; 52 miles N.E. of Christianfand. N. lat. 58° 43'. E. long. 9° 29'.

RISOLUTIONE, Ital. in *Music*, the resolution of a discord. See DISCORD, and PREPARATION.

RISOLUTO, Ital. resolved solution, as of a close canon by putting it in score, or by signs.

RISORIUS NOVUS, in *Anatomy*, a name given by Santorini to a muscle, formed of that part of the quadratus genæ which arises from the cheek. See QUADRATUS GENÆ.

RISPOSTA, or RIPOSTA, Ital. an answer, whether in a dialogue or to a regular fugue. For the bringing in the answer to a fugue agreeable to the rigid laws established by the fathers of the science, the old ecclesiastical composers, there are many rules to be observed. See FUGUE.

RISS, or RUSS, in *Geography*, a river of Germany, which passes by Biberach, and runs into the Danube, about six miles above Ulm.

RISTI, a town of Sweden, in the province of Cajana; 25 miles N.E. of Cajanaborg.

RISTIGOUCHE RIVER, a river of Canada, which runs into Chaleur bay, navigable for ships 20 miles from its mouth. It abounds with salmon and wild fowl. On its N. bank, near its mouth, is an Indian village.

RISTORFF, a town of Austria, near Schwannaitadt.

RISVIGLIATO, Ital. in *Music*, when applied to a gay and lively movement succeeding one that is sorrowful, implies vivacity and spirit.

RISUM, in *Geography*, a town of East Friesland; 6 miles W. of Emden.

RISUS. See LAUGHTER, and LUNGS.

RISUS Caninus is a kind of laughter in which the lips are contracted, so as to shew all the teeth.

RISUS Sardonius, Sardonian laughter, is a forced, spiteful laughter; or a laughter that does not go beyond the teeth.

The phrase is by some said to be founded on this, that in Sardinia there is a venomous plant, which occasions such a contraction of the muscles of the face in persons it kills, that they seem to die laughing in this manner.

RISZOW, in *Geography*, a town of Poland, in the palatinate of Kiev; 30 miles N.E. of Bialacerkiev.

RITA, a town of Brazil, in the government of Goyas; 80 miles E. of Villaboa.

RITARDATO, and **RITARDANDO**, Ital. in *Music*, is relaxing the measure; better expressed now by *rallentando*, which see.

RITCHEL, in *Geography*, a branch of the river Indus, which separates a little above Tatta, and runs into the Arabian sea, N. lat. 24° 15'. E. long. 66° 43'.

RITE, **RITUS**, in *Theology*, denotes the particular manner or form of celebrating or performing the religious ceremonies, which obtains in this or that place.

The eastern people, Armenians, &c. celebrate divine service according to the Greek rite. The western world follow the Latin rite; or that of the Roman church.

The English observe the rite of the church of England, prescribed in the book of Common Prayer, &c.

RITHER, or **RIDER**, in *Mining*, is a stone or thin cleft that lies in the vein; the ore sometimes runs on both sides it. Sometimes the rither is so thick, that it parts the vein, and makes one vein two.

RITIA, in *Ancient Geography*, *Sheebah*, a town of the interior of Africa, in Mauritania Cæsariensis, situated S. of Victoria. It is mentioned by Ptolemy; and still exhibits some fragments of Roman walls.

RITORNELLO, or **REFRET**, in *Music*, the burden of a song, or a repetition of the first or other verses of the song, at the end of each stanza or couplet.

The word is Italian, and signifies properly a *little return*, or a short repetition, such as that of an echo, or of the last words of a song; especially when the repetition is made after a voice, by one or more instruments.

But custom has extended the use of the word to all symphonies, played before the voices begin, and which serve by way of prelude or introduction to what follows.

In the partitions or score of the Italian music, we frequently find the ritornellos signified by the words *fi suona*, to shew that the organ, harpichord, piano-forte, or the like, are to repeat what the voice has been singing.

In accompanied recitatives, the ritornels, or interstitial symphonies, are not repetitions of vocal passages; but are often beautiful and picturesque periods of symphony, expressive of the sentiments and situation of the singer.

RITRO, in *Botany*, corrupted, as it seems, from the *ῥιτρον* of Theophrastus, as far as can be conjectured, appears to have been some plant of the thistle kind. The name is now used as the specific appellation of a kind of *ECHINOPS*; see that article.

RITROGRADO, Ital. in *Music*. See **RETROGRADO**.

RITSCHA, in *Geography*, a town of Bohemia, in the circle of Kaurzim; 12 miles S.E. of Prague.

RITSCHENHAUSEN, a town of Germany, in the county of Henneberg; 3 miles S.S.E. of Meinungen.

RITSCHIEN, a river of Stiria, which runs into the Laufnitz, 4 miles S.E. of Furstenfeld.

RITSON, **TRISTRAM**, in *Biography*, born about the year 1580, at Wincott, in Devon, was educated at Great Torrington, and by his rapid progress in learning he very soon became fitted for the higher improvements of the university of Oxford, of which he was admitted a member, being entered probably of Exeter or Pembroke college, about the latter end of the reign of queen Elizabeth. At Oxford he was much distinguished for his learning, and his accomplishments as a gentleman. He, however, appears to have left college without taking any scholastic degree, and retired into his own country, which, according to his biogra-

pher, was probably owing to the death of a sister, upon which he became possessed of the estate of Wincott. Here he drew up a large volume, entitled "The Chorographical Description or Survey of the County of Devon, with the City and County of Exeter, containing Matter of History, Antiquity, Chronology, the Nature of the Country," &c. It was begun in 1605, and finished in 1630.

The author did not print this Description, but a great many manuscript copies were long in circulation in the county. A mutilated edition of it was printed in two volumes 8vo. in 1714: it was afterwards printed from the original in one volume 4to. in 1735. But the most perfect and valuable edition was published in 1811, from a manuscript edition in the possession of John Coles, esq. of Stonehenge; to which the editors made some important additions, and prefixed, as an introduction, which renders the volume much more interesting, "Remarks on the present State of the County of Devon," the object of which was to compare the present and past conditions of the county in those particulars to which the author directed his attention, and to add a brief account of such subjects as either escaped his notice, or have acquired their existence or importance since his time.

Mr. Ritson lived to a great age, dying in the year 1640; he was interred at St. Giles Wincott, without tomb or monument. "He," says Prince in the *Worthies of Devon*, "that with great expence of money, time, and labour, sought to perpetuate the memory of many persons and families, hath no monument to continue his own; unless that lasting one his "Survey of the County of Devon." See *Chorographical Description*, ed. 1811.

RITSON, **JOSEPH**, was born in 1752, at Stockton on Tees, in the county of Durham, and was brought up to the profession of the law. As a consulting barrister and conveyancer he was very much distinguished: but his literary enquiries were by no means confined within the limits of his profession; he very successfully investigated the old English literature, particularly of the seventeenth century. He died in the year 1803. His works are "Observations on Johnson's and Stevens's Edition of Shakspeare;" "Curfory Criticisms on Malone's Edition of Shakspeare;" "Observations on Warton's History of English Poetry;" "Descent of the Crown of England;" "Collection of English Songs, 3 vols. and of Scotch Songs, in 2 vols.;" "English Anthology;" "Metrical Romances," 3 vols.;" "Bibliographia Poetica;" "A Treatise on Abstinence from Animal Food;" and other pieces. As an historian, he was rigidly accurate; as a critic, he was uncharitable and severe. The language of his writings is harsh, rugged, and barren; and all his publications are farther disfigured by the affected singularity of their orthography. *Monthly Mag.* Nov. and Dec. 1803, and *Gent. Mag.*

RITTANGEL, **JOHN-JOSEPH**, a learned professor of the Oriental languages, at Königsberg, in the 17th century. According to some writers he was born of Jewish parents, and educated in the religion of his fore-fathers, but afterwards became a convert to Christianity; others assume that he was a German by birth, and educated in the principles of Popery, and that he became a convert to the institutions of Moses, and received circumcision at Hamburg, but that in more mature life he embraced the Protestant religion, becoming at first a Calvinist and afterwards a Lutheran. On the authority of a letter given by Bayle, he was a native of Forcheim in Franconia, in the diocese of Bamberg, and brought up to the Roman Catholic faith. Having become a proficient in classical learning, his attention was directed to the study of the oriental languages, and he went to Constantinople, where he remained twelve years, and during that

time had much intercourse with the learned Jews in that city. Upon his return into Germany he embraced the Lutheran religion, and went to Königsberg, where the elector of Brandenburg appointed him professor extraordinary of the Hebrew tongue. He devoted himself now to the illustration of the antiquities of the Jews, and the production of evidence from their writings in support of the truth of Christianity, or of doctrines commonly reputed orthodox. His writings contain severe criticisms on the productions of Kircher, Scaliger, Vorstius, the Buxtorfs, and other learned men, whose proficiency in the Hebrew tongue he affected to hold in low estimation. The time of his death is uncertain, but by a dedication to one of his pieces, it is known that he was living in the year 1652. He was author of the following works: "Liber Jezira, qui Abrahamo Patriarchæ adscribitur, una cum Comment.;" "Liber Veritatis, &c." intended to prove that the ancient Jewish church believed the mystery of the Trinity, and the eternal divinity of the Messiah; and several others.

RITTEBURG, in *Geography*, a town of the county of Mansfeld; 2 miles S.S.E. of Artern.

RITTENHOUSE, DAVID, in *Biography*, a distinguished American philosopher and mathematician in the 18th century, was a native of Pennsylvania, and born in the year 1732. By the dint of genius and application, he was enabled to mingle the pursuits of science with the active employments of a farmer and watch-maker. The latter of these occupations he filled with unrivalled eminence among his countrymen. Some of its nicer operations continued to be his favourite mode of relaxation during all the subsequent periods of his life. In the year 1769, he was invited by the American Philosophical Society to join a number of gentlemen who undertook to observe the transit of Venus; when he particularly distinguished himself by his observations and calculations. He afterwards constructed an observatory, where he made such valuable observations and discoveries, as tended to the general diffusion of science in the western world. During the American war, the philosopher did not claim an exemption from the duties of patriotism; he thought, spoke, and acted like a free man. After the conclusion of it, he successively filled the offices of treasurer of the state of Pennsylvania, and director of the national mint: in the first of which he manifested incorruptible integrity, and in the last, the rare talent of combining theories in such a way as to produce correct practical effects. He succeeded the illustrious Franklin in the office of president of the American Philosophical Society; but towards the close of his days he withdrew from public life, and spent his time in retirement. "There," says one of his eulogists, "we behold him the object of love, admiration, and reverence. In his intercourses of friendship, sincerity and simplicity went hand in hand. A stranger to the too common arrogance of high pretensions, he met every man on the ground of friendly reciprocity. Feeling a superior attachment to those who propagated science, he did not conceal the estimation in which he held them. He was among the first to welcome to America the persecuted philosopher of England (Priestley), and formed with him an intimacy which only required time to be cemented into a lasting friendship." After a very severe illness of a few days' continuance, he died on the 10th of July 1796, about the age of 64. He had the degree of L.L.D. conferred upon him. To the "Transactions" of the American Philosophical Society he contributed several excellent papers, chiefly on astronomical subjects. Gentleman's Mag. Sept. 1796. Monthly Mag. Oct. 1796.—M.

RITTERA, in *Botany*, named by Schreber in honour

of Dr. John James Ritter, a native of Berne in Switzerland, who practised as a physician, in Silesia, during the middle of the 18th century, and who was the author of various tracts upon Natural History. Schreb. 364.—It is now referred to SWARTZIA; see that article.

RITTERSHUYS, CONRAD, in *Biography*, a learned jurist and philologist, was born at Brunswick in 1560. After having made a great progress in the learned languages, he went to Helmstadt for the study of theology, but his inclination led him to prefer jurisprudence. He removed to Altdorff for the further pursuit of this study, and thence to Ingolstadt. He took the degree of doctor of law at Basil in 1591, and was nominated professor in that science at Altdorff, where he died in 1613. He was the author of "Jus Justinianeum, five Novellarum Methodica explicatio," 1615, 4to. His philological labours were notes on "Petronius" and "Phædrus;" commentaries on "Salvianus;" on "Oppian de Venatione et Piscatione," with a Latin version; "Guntheri Ligurinus;" "Sacrarum Lectionum, Lib. viii."

RITTERSHUYS, NICHOLAS, son of Conrad, born at Altdorff in 1597, was also a man of learning and a jurist, and particularly applied to historical and genealogical enquiries. He studied at Helmstadt, and afterwards travelled into various countries of Europe. On his return he took a doctor's degree in 1634, and was appointed professor of feudal law at Altdorff. He died in 1670. Nicholas edited several of his father's works, and in 1638 published an oration on "Hanno's Periplus." He was the author of a large folio, entitled "Genealogiæ Imperatorum, Regum, Ducum, Comitum, &c. ab Anno 1400 ad Annum 1664." Several of his letters are printed in the "Epistolæ celebrium Virorum," 1705.

RITUAL, RITUALE, a church-book, directing the order and manner of the ceremonies to be observed in celebrating divine service in a particular church, diocese, religious order, or the like.

The ancient heathens had, likewise, their rituals, or *rituales libri*; those of the Etrurians were much famed. See ARUSPICUM Libri.

These books contained the rites and ceremonies to be observed in the building of a city, in the consecrating of a temple or an altar, in sacrificing and deifying, in dividing the curiæ, tribes, centuries, and, in general, in all their religious ceremonies.

There are several passages in Cato's books, De Re Rustica, which may give us some idea of the rituals of the ancients.

"The principal difference (says bishop Stillingfleet, Orig. Brit. p. 287.) between the Roman and Gallic ritual of St. Germanus, which the Britons had adopted before the arrival of St. Austin, was in the church music, in which the Romans were thought to excel other western churches so far, that the goodness of their music was the principal incitement to the introduction of their offices."

RITZEBUTTEL, in *Geography*, a town of the duchy of Bremen, on a small river, which runs into the German ocean, between the mouths of the Elbe and the Weser; 38 miles N. of Bremen. N. lat. 53° 52'. E. long. 8° 37'.

RITZENBUTTEL, or Ritzbuttle, is a small town, containing about 200 houses, half a mile from Cuxhaven, with a castle garrisoned by Hanoverians. The road for foot-passengers, from Ritzbuttle to Cuxhaven, is on a causeway, raised about eight feet from the carriage-road; but being made of clay, it is, in wet weather, extremely dirty and slippery. The road for carriages is very bad. The port

of Cuxhaven having only two or three small hovels, and a wind-mill, the passengers by the packets reside during their stay at Ritzbottle.

RIVA, or RIFF, a town of the county of Tyrol, at the end of the Garda lake; 16 miles W.S.W. of Trent.—Also, a river of the Tyrolese, which runs into lake Garda, near the town of the same name.—Also, a town of France, in the department of the Po, seated on an eminence, in the middle of a plain, which extends to the W. and S., and is nearly surrounded with water, over which are two bridges, one of wood, the other of stone. The adjacent hills are covered with vines and fruit-trees, and the plain produces abundance of grain; most of the houses within the walls are furnished with gardens; two miles E. of Chieri.—Also, a town of Italy, in the bailiwick of Lugano; 8 miles S. of Lugano.—Also, a town of Italy, in the Valteline; 6 miles S. of Chiavenna.—Also, a town of Italy, in the department of the Mela; 14 miles N.N.W. of Brescia.—Also, a town of the Ligurian republic; 6 miles N.N.E. of Savona.

RIVAGE, RIVAGIUM, a toll anciently paid to the king on some rivers, for the passage of boats or vessels therein.

RIVAL, RIVALIS, a term of relation applied to two persons who have the same pretension.

It is properly used for a competitor, in love; and figuratively, for an antagonist in any other pursuit. The intrigues of comedies and romances usually turn on the jealousies of rivals, who dispute for the same mistress.

The lawyers derive the word from the Latin *rivus*, stream, *quod ab eodem rivo aquam hauriant*.

Donatus supposes it to have been formed hence, that beasts coming to drink at the same brook, or fountain, frequently quarrel.

Cælius says, that rivales were originally such whose fields were parted by a brook or rivulet, the course of which being liable to be varied several ways, occasioned frequent disputes and law-suits.

RIVALTA, in *Geography*, a town of France, in the department of the Po, on the Sangon; 6 miles S.W. of Turin.—Also, a town of Italy, in the department of the Olona; 15 miles E. of Milan.

RIVANNA, a river of Virginia, which unites with the Fluvanna, to form James river, about two miles above Elk island. It is navigable for canoes and batteaux, to its intersection with the S.W. mountains, about 22 miles.

RIVAROLI *de Fuori*, a town of Italy, in the department of the Mincio; 20 miles S.W. of Mantua.

RIVAROLO, a town of France, in the department of the Po, on the Orco; 15 miles N. of Turin.

RIVault, DAVID, in *Biography*, a French man of letters and various writer, was born at Laval, in the province of Perche, about the year 1571. He was brought up in the family of the count de Laval, and for some time followed the military profession, serving in Italy about the close of the 16th century, and in Holland in the year 1602. During the following year, Henry IV. appointed him one of the gentlemen of his bed-chamber. In 1605 he accompanied the young count de Laval into Hungary, and entered into the service of the emperor against the Turks. On his return to his native country, he devoted himself to literary and scientific studies, in which he had before made considerable progress. In 1611 he was appointed sub-preceptor to the young king Lewis XIII., and had a pension of 3000 livres settled upon him. The office of principal preceptor becoming vacant during the next year, he received that appointment, and was honoured with the title of counsellor of

state. In 1614, the king conferred on him letters of nobility. He died at Tours, in 1616, about the age of 45. He is spoken of with high esteem by several of the most celebrated writers of his time, particularly by Casaubon, Scaliger, Vossius, Erpenius, and Menage. His works consist of "The States, or a Discourse concerning the Privileges of the Prince, the Nobles, and the third Estate," &c.; "Elements of Gunnery," which is a curious and very scarce work; "Archimedis Opera quæ extant, Græcè et Lat. novis Demonstrationibus illustrata;" &c. folio, and other pieces.

RIVE *de Gier*, in *Geography*, a town of France, in the department of the Loire, and chief place of a canton, in the district of St. Etienne; 4 miles N.E. of St. Etienne. The place contains 4263, and the canton 15,089 inhabitants, on a territory of 160 kilometres, in 13 communes.

RIVEL *de les Semals*, a town of France, in the department of the Aube; 9 miles W.N.W. of Quillan.

RIVELLES, a town of Spain, in Catalonia; 12 miles N. of Cervera.

RIVELLO, a town of Naples, in the province of Basilicata; 12 miles S.E. of Lauria.

RIVER, FLUVIUS, or *Flumen*, a stream or current of fresh water, flowing in a bed or channel, from a source or spring, into the sea.

If the stream be not large enough to bear boats, or small vessels, loaden, it is properly called, in English, by the diminutive *rivulet*, or *brook*; by the Latins *rivus*; and by the French *rivière*. If it will only bear such vessels, the Latins call it *amnis*. If it be considerable enough to carry larger vessels, it is called by the general name *river*; by the Latins *fluvius*, and *flumen*; and by the French *fleuve*; between all which the difference is only as to greater and less.

Some will have none to be properly rivers, except those which bear the same name from their source to their mouth.

Others, none but those which empty themselves immediately into the sea; and not into any other river.

Rivulets have their rise, sometimes from great rains, or great quantities of thawed snow; especially in mountainous places; as in the long ridges of Africa, India, Sumatra, &c. But the generality of rivulets arise from springs.

Rivers themselves all arise either from the confluence of several rivulets, or from lakes; nor is there any great river, such as the Rhine, Elbe, &c. known to flow from a single spring.

The Volga, *e. gr.* consists of above two hundred rivulets, all flowing into it, before it reaches the Caspian; and the Danube receives as many.

The Rhine and the Po receive each above a hundred others, great and small; and the river of the Amazons receives into its large bed a prodigious number, some of which are five or six hundred leagues in length, and are of such a depth and breadth as render them principal rivers.

Pliny, indeed, and Cardan, say, that the Nile receives none; but the later travellers into Abyssinia assure us of the contrary.

The Rhine, Rhone, Danube, Borysthenes, &c. arise originally from springs in the mountains; and the Nile, the Volga, the great river of St. Laurence, &c. from lakes.

It has been held by many, that all springs and rivers owe their origin to rains and dews; but there are some springs which cannot be accounted for on this principle, though others very well may. The intermitting springs, which flow

RIVER.

flow violently in rainy seasons, and are dry in summer, are probably owing to rains; but there are some springs which discharge more water annually than all that falls in rains and dews in the neighbouring country. The great perennial spring, at Willowbrig, in Staffordshire, is of this kind, and that of the Sorgne, in France, is much more eminently so; the river of that name being, according to Gassendus, navigable up to the very springs which are its source.

But if such springs as these discharge too great a quantity of water for the supply of rains and dews, how is it possible, that such small supplies of water as these can afford the constant currents of the larger rivers? The Volga alone, according to Ricciolus, pours forth as much water in a year's time into the Caspian sea, as would suffice to drown the surface of the whole earth. The river of St. Laurence, in America, pours forth nearly as much as this. If either of these rivers alone do, as has been affirmed, from calculations, discharge annually as much water as falls in the same time in rains and mists upon the surface of the whole earth; from whence are all the rest to be supplied, according to the system of their all being made by rains; and, particularly, where is left the supply for the Rio de la Plata, which Ricciolus affirms to be larger than the Nile, the Ganges, and the Euphrates, put together? its mouth being ninety miles wide, and running with that violence into the sea, that it makes it fresh for two hundred miles together. These, and the other rivers of the several parts of the globe, upon a very moderate calculation, discharge at least five hundred times as much water into the sea, as falls upon the whole surface of the earth, in rains, mists, dews, snows, &c. in a like space of time.

As it is evident, therefore, that these cannot be supplied by rains, so neither is it possible that the several hot springs and the salt springs can be supplied that way: the origin of springs also in places where there falls little or no rain, and where the conservatories must needs be too small to contain a supply, are great proofs that rain and mists are not the origin of springs, at least not in all places. The isles of Mago, Rotunda, and the Strophades, and the rock on which the Maiden Tower stands in the Thracian Bosphorus, cannot be supplied with, or retain a sufficiency of rain-water to supply constant springs, yet such are always found running there.

It cannot be otherwise but that there are subterranean communications between the sea and the sources of fountains, rivers, and the larger springs, by which these are supplied; and there are certainly charybdes which swallow the sea for these purposes; and when these happen to be stopped, the largest rivers have been dried up, and wholly ceased to run for a considerable time: this we have accounts in history has happened to the Thames, the Trent, and Medway, in England; the Elve, the Motala, and Gulspang, in Sweden, and other rivers in other countries. If, on the other hand, these charybdes happen to be too open, fresh-water springs depending upon them will become salt. This we have instance of in history also; and even so old a writer as Pliny has said that this once happened in Caria near Neptune's Temple. (Plot. de Origine Fontium.) See EVAPORATION and SPRING.

RIVERS, *Phenomena and Variations of.* Rivers are found subject to great alterations, at different seasons of the year, day, &c. from frequent rains and melted snow. Thus in Peru and Chili many of the rivers are almost insensible in the night-time, and only flow by day, as being then augmented by the dissolution of the snow on the mountains Andes. Thus the Volga abounds in water in May and June, so as

to cover the sand-banks, &c. which all the rest of the year lie bare, so as scarcely to allow a passage to the loaded ships. Thus also the Nile, Ganges, Indus, &c. are frequently so increased, as to overflow; and that either in the winter, from rain, or in the summer, from the melting of the snow. Some rivers bury themselves under ground in the middle of their course, and break out again in other places, like new rivers. Thus the Niger, which some cosmographers erroneously derive by a subterraneous channel from the Nile; because it swells at the same time with the Nile, without any other apparent cause—the Niger itself has been supposed by some to be hidden under the mountains of Nubia, and to rise again on the western side of those mountains; whereas, in reality, it is lost in lakes or sands. Thus, also, the Tigris is lost in the mountain Taurus, &c.

Aristotle, and the poets, mention several such rivers about Arcadia: Alpheus, a river of Arcadia, is particularly famed. This, being swallowed up in the ground, is supposed, by the Greek authors, to continue its progress under the earth, and under the bottom of the sea, into Sicily; where, breaking up near Syracuse, it forms the river Arethusa. The great reason of this opinion was, that, every fifth summer, the river Arethusa, in Sicily, cast up the dung of cattle about the time of the celebration of the Olympic games in Achaia, when the dung of victims was used to be cast into the Alpheus.

Some rivers empty themselves into the sea by one mouth, some by several. Thus, the Danube opens into the Euxine sea by seven mouths; the Nile by seven; and the Volga by at least seventy. The cause of this variety of mouths Varenus attributes principally to the banks of sand, &c. accumulated in them; which, gradually increasing, form islands, by which the channel is divided into several branches. Indeed, the ancients tell us, that the Nile formerly only emptied itself at one mouth, called the *ostium Canopicum*; and add, that the other six are adventitious, or artificial.

The channels of rivers, except such as were formed at the creation, Varenus endeavours to prove to be all artificial, and dug by men. His reasons are, that, when a new spring breaks forth, the water does not make itself a channel, but spreads over the adjacent land; so that the people have been necessitated to cut it a channel, to secure their grounds; and that a great number of channels of rivers are certainly known, from history, to have been dug by men, &c.

As to the question, whether those rivers which run into others, have made themselves that way by their own motion, or have been turned thither in canals cut by men? he takes the latter to be the more probable; and concludes the same of the arms, or branches, of rivers, and of the turns by which islands are formed in the Tanais, Volga, &c.

To the question, why we have no salt rivers, when there are so many salt springs? he answers, that it is because men, having no occasion for salt water, have not dug channels to conduct the water of salt springs; salt being procurable at less expence.

The water of most rivers carries with it particles of metals, minerals, sands, or oily and fat bodies, &c. Thus, some rivers bring sands intermixed with grains of gold; of which kind is, 1. A river in Japan. 2. Another in the island of Lequeo, near Javon. 3. A rivulet in Africa, called Arroe, breaking out of the foundation of the mountains of the moon, in which there are golden mines. 4. A river in Guinea, where the negroes separate the gold-dust from the sand, and sell it to the Europeans, who traffic thither for that very purpose. 5. In some rivulets near the city of Mexico, there are grains of gold taken up, especially after

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after rain; which is also to be understood of all the other rivers, none of which yield any thing considerable, except in rainy seasons. 6. In Peru, Sumatra, Cuba, Hispaniola, and Guinea. Lastly, there are several brooks in the countries about the Alps, especially Tyrol, out of the sediment of whose waters gold has been drawn, though there be no grains conspicuous in them. Add to this, that the Rhine also, in many places, has afforded a golden mud.

As to rivers that bring grains or particles of silver, iron, copper, lead, &c. we find no mention of them in authors, though, doubtless, there are great numbers of each; and many of the medicinal effects of mineral waters are, doubtless, owing to particles of these kinds.

We must not here omit a water in Germany, which is ordinarily supposed to change iron into copper. The truth is, there is no real conversion of the metal; all that is done is, that the cuprine and vitriolic particles in the water corrode the iron; and, detaching parts of them by means of the motion of the water, coppery particles succeed in their room.

From this variety in the mixture of river-water result various qualities, different specific gravities, different colours, &c.

Some rivers, at certain seasons of the year, swell so as to overflow their banks, and drown the neighbouring lands. Of these the most eminent is the Nile, which rises so as to cover all Egypt, except the hills. The inundation begins about the seventeenth day of June, and increases for the space of forty days, and decreases for as many; during which period, the cities of Egypt, which are all built on hills, appear as so many islands.

To these inundations Egypt owes all its fertility; the heavens there affording no rain, or at least none in any respect considerable. Hence, as the inundation is great or small, Egypt, for that year, is fruitful or barren.

The ancient Greeks, &c. were much perplexed in assigning the cause of this inundation. From the modern English and Portuguese traders into Congo, Angola, Monomotapa, &c. we learn, that the source of the Nile is in a large lake called Zaire, round which are the mountains of the moon, which being about 10° to the south of the equator, instead of being covered with snow in their winter, have rain every day, at least two hours before, and two hours after noon. So that their tops are always covered with clouds; and the rains are, at the proper season, almost continual. Hence torrents are constantly descending from the mountains into the lake of Zaire; whence they flow into the channel of the Nile, and other rivers arising from the same lake; and hence the inundation of the Nile. See NILE and NILO-METER.

Mr. Bruce is the first person who, in his "Travels to Discover the Source of the Nile," has described, from his own observations, the spot in which he apprehends that the Nile springs.

Tracing one of the streams, that run into the lake Tzana, to a swamp in the 11th degree of N. lat. he there remarks the head of the Nile, as our modern map-makers had actually done before he visited this dreary region. Whether his guide deserved credit, and whether he could justly infer that this rivulet was the Nile from the respect paid to it by the barbarous natives, it is not necessary particularly to enquire. The most important object in investigating the source of the Nile is to account for its extraordinary inundations.

In doing this, Mr. Bruce has selected from the various opinions enumerated by Diodorus Siculus (l. i. c. 24.) that of Democritus of Abdera, and Agatharcides of Cnidus,

which agrees in the main with that of Herodotus (l. ii. c. 8.) and has well explained the manner in which the sun, continuing nearly stationary for some days in the tropic of Capricorn, rarefies the air, and collects a quantity of vapours from the Atlantic on the west, and the Indian ocean on the east; and then, in its progress north towards the tropic of Cancer, draws these vapours after him. So that as he advances, the rainy season begins upon his arrival at the zenith of every place, and the rains continue and increase after he has passed it in his progress northward.

In April many rivers join the Nile, and enable it to force its way through the stagnant lake Tzana, without mixing with it. In the beginning of May many other streams pour themselves into the same lake, and furnish the Nile with an additional supply of water. In the beginning of June, the sun having passed over Abyssinia, the rivers are there full, and the time of the greatest rains in this country is during the sun's being almost stationary in the tropic of Cancer. These rains are collected by the four great rivers of Abyssinia, of which the Nile is one, which derives also a very copious supply from the White river, that rises in a country of almost perpetual rain.

As the vapours meet with no mountains to interrupt their progress in the flat country that lies between Gerri and Syene, the tropical rains extend no farther north of the line than 16° .

When the sun declines towards the equator, he reverses the effects which he produced in his passage northward; and after his arrival at the line in the autumnal equinox, his influence ceases on the side of Abyssinia, and extends itself to the southern hemisphere. Thus on the 25th of September, three days after the equinox, the Nile is generally found at Cairo to be at the highest, and then begins to decrease. Mr. Bruce explains the inundations that take place south of the equator. The ancients were not unacquainted with this cause of the inundations of the Nile. The tropical rains falling to the extent of 16° on each side of the line gave rise to the Nile and to its tributary streams which flowed northward, through the kingdom of Sennar, &c. as well as to the Zebee, and many large rivers which flow southward into Ethiopia, and according to the descent of the countries into the Indian or Atlantic ocean. Homer gives to the Nile the epithet *δισπέρης, qui calidus descendit, a river produced and fed by rains*. See NILE.

The other rivers which have any notable stated inundations, are the Gambia, and the Niger, which overflow at the same time with the Nile, and lose themselves in sands or lakes. (See NIGER.) Leo Africanus says, it begins on the 15th day of June, increases for forty days, and decreases as long. The Zaire, a river of Congo, is affected in the same manner with the Nile. (See ZAIRE.) The Rio de la Plata, in Brasil, as Maffeus observes, overflows at the same time with the Nile. (See Rio de la PLATA.) Of the same kind of rivers is the Ganges (which see); and the Indus, both which last overflow in June, July, and August; at which times the natives save great quantities of the water in ponds to serve them the rest of the year; several rivers flowing out of the lake Chiamay into the bay of Bengal, which overflows in September, October, and November: these all bring a very great fertility with them to the ground; the river Macoa, in Camboia; the river Parana, or Paranguafa, which some will have to be the same with the Silver river; several rivers in Coromandel, a part of India, which overflow in the rainy months, from the great quantity of water issuing from the mountain Gatis; the Euphrates, which overflows Mesopotamia certain days in the year; and, lastly, the river Sus, in Numidia.

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The rivers most celebrated for their length, breadth, swiftness of current, &c. are, the Nile, which runs almost in a straight course two thousand five hundred and twenty geographical miles; the Niger, which runs two thousand four hundred miles; the Ganges, two thousand miles; the Burrampooter, the same distance; the Ob, sixteen hundred miles; the Jenniflee, in Asia, about the same length with the Ob; the river Orellana, in America, sixty miles broad at its mouth, and five thousand miles long; the Rio de la Plata, about ninety miles broad at the mouth; the Omarrannan, another river of Brasil; and the great river of St. Laurence, near two thousand five hundred miles long. See the account of each river under its respective name.

Major Rennell, in his "Memoir," has estimated the proportional lengths of course of some of the most noted rivers in the world by the following numbers:

European Rivers.				
Thames	-	-	-	1
Rhine	-	-	-	5 $\frac{1}{4}$
Danube	-	-	-	7
Volga	-	-	-	9 $\frac{1}{2}$
Asiatic Rivers.				
Indus	-	-	(probably)	6 $\frac{3}{4}$
Euphrates	-	-	-	8 $\frac{1}{2}$
Ganges	-	-	-	9 $\frac{1}{2}$
Burrampooter	-	-	-	9 $\frac{1}{2}$
Nou Kien, or Ava	-	-	-	9 $\frac{1}{2}$
Jenniflee	-	-	-	10
Oby	-	-	-	10 $\frac{1}{2}$
Amoor	-	-	-	11
Lena	-	-	-	11 $\frac{1}{2}$
Hoanho (of China)	-	-	-	13 $\frac{1}{2}$
Kian Keu (of ditto)	-	-	-	15 $\frac{1}{2}$
African River.				
Nile	-	-	-	12 $\frac{1}{2}$
American Rivers.				
Mississippi	-	-	-	8
Amazons	-	-	-	15 $\frac{1}{2}$

By the statute of Westm. 2. cap. 47, the king may grant commissions for persons to take care of rivers, and the fishery in them; and the lord mayor of London is to have the conservation in breaches and ground overflown as far as the water ebbs and flows in the river Thames. (4 Hen. VII. cap. 15.) Persons annoying the river Thames, making shelves there, casting dung in it, or taking away stakes, boards, timber-work, &c. of the banks, incur a forfeiture of 5*l.* by stat. 27 Hen. VIII. cap. 18. Commissioners were appointed to prevent exactions of the occupiers of locks, weirs, &c. upon the river Thames, westward from the city of London, to Cricklade, in the county of Wilts, and for ascertaining the rates of water-carriages on the said river, by stat. 6 & 7 W. III. and this statute is revived, with authority from the commissioners to make orders and constitutions to be observed, under penalties, &c. by 3 Geo. II. cap. 11.

By statutes 8 Geo. II. cap. 20, and 4 Geo. III. cap. 12, it is made felony, without benefit of clergy, maliciously to cut down any river or sea-bank, by which lands may be destroyed, and to destroy sluices or locks upon navigable rivers. See NUSANCE, and LARCENY.

RIVER, in *Physics*, denotes a stream of water running by its own gravity from the more elevated parts of the earth

towards those which are more depressed, in a natural bed or channel open above.

If this channel is artificial, it is called a canal; of which there are two kinds, *viz.* that whose channel is every where open without sluices, called an artificial river, and that whose water is kept up or let off by means of sluices, which is properly a canal.

RIVERS, *Hydraulic Theory of*.—The theory of moving waters is certainly one of great importance, and has therefore, for a long time, excited considerable interest, as well among practical engineers, as speculative mathematicians; yet it must be acknowledged that it is but very lately any thing approaching to a well-founded theory has been established. One of the first and most distinguished of those who attempted to reduce the motion and discharges of rivers to correct principles, was Guglielmini; and if his theory was false and hypothetical, yet he was the means of drawing the attention of philosophers to these inquiries; and his deductions, though in many respects incorrect, are nevertheless entitled to a place in an article on this subject.

This author observes, that rivers have usually their sources in mountains or elevated lands, and that it is in their descent from these they acquire their velocity, or acceleration, which maintains their future current. In proportion as they advance farther, this velocity diminishes, on account of the continual friction of the water against the bottom and sides of the channel, of the various obstacles they meet with in their progress, and of their arriving, at length, in plains, where the descent is less; and their inclination to the horizon, of consequence, greater. Thus the Reno, a river of Italy, which gave occasion, in some measure, to these speculations, is found, near its mouth, to have scarcely a descent of fifty-two seconds.

If the acquired velocity be quite spent, through the many obstacles, so that the current becomes horizontal, nothing will then remain to propagate the motion, and continue the stream, but the depth, or the perpendicular pressure of the water, which is always proportional to the depth. And happily for us, this resource increases, as the occasion for it increases; for, in proportion as the water loses of the velocity acquired by the descent, it rises and augments in depth.

It further appears, says he, from the laws of motion pertaining to bodies moved on inclined planes, that when water flows freely upon an inclined bed, it acquires a velocity, which is always as the square root of the quantity or declivity of the bed. But in an horizontal bed, opened by sluices or otherwise, at one or both ends, the water flows out by its gravity alone; and the flowing is quicker or slower in a direct ratio of the respective heights of the water, by reason of the weight of the superior waters upon the inferior. Hence it follows, first, that as much as the declivity of the bed or channel of a river is greater, so much also will the velocity of the flowing waters be proportionably increased.

Secondly, as much as the water in an horizontal bed is deeper, so much will the velocity of the current be increased; and this velocity will diminish in proportion to the decreasing depths of the water in the bed.

Thirdly, abstracting from the resistance caused by the bottom and sides of the bed, as much nearer as the water is to the bottom, so much will its motion be accelerated; not only because the inferior waters are more compressed by the superior in proportion to their greater depth; but also because the inferior ones have a greater declivity than the superior, by reason of their greater depth in the bed,

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where they are more depressed with respect to the elevation of their common source or spring.

The upper parts of the water of a river, and those at a distance from the banks, may continue to flow, from the single cause, or principle of declivity, how small soever it be; for, not being detained by any one obstacle, the minutest difference of level will have its effect; but the lower parts, which roll along the bottom, will scarcely be sensible of so small a declivity; and will only have what motion they receive from the pressure of the superincumbent waters.

The natural cohesion of the particles of water, and their implication, as it were, with one another, make the lower, which are moved by means of the depth, carry along with them the upper, which, in an horizontal channel, would have no motion at all: or, in a channel very little inclined, next to none; so that the lower, in this case, communicate to the upper a part of the motion they have received from the pressure of it. Hence, from the pressure, it frequently happens that the greatest velocity of a river is about the middle of its depth, or that point, which is the farthest possible from the surface of the water, and from the bottom and sides of the bed; such middle parts having the advantage of being pressed with half the depth of the river, and of being free, at the same time, from the friction of the bottom; whereas, on the contrary, the least velocity of the water is at the bottom and sides of the bed, because there the resistance resulting from friction is the greatest, which is communicated to the other parts of the section of the river, in an inverse duplicate proportion of the distances from the bottom and sides combined together.

To find whether the water of a river, almost horizontal, flows by means of the velocity acquired in its descent, or by the pressure of its depth, set up an obstacle perpendicular to it; if the water rise and swell immediately against such obstacle, it runs in virtue of its fall; or, if it stop a little while first, in virtue of its pressure.

Rivers, according to this author, almost always make their own beds. If the bottom have originally been a large declivity, the water, in consequence of it, falling with a great deal of force, will have swept away the most elevated parts of the soil, and carrying them lower down, will gradually render the bottom horizontal; where the stream is swiftest, there will the earth be most dug up; and, consequently, there the greatest cavity will be made.

The water having made its bed horizontal becomes so itself, and consequently rakes with the less force against the bottom, till at length that force becomes only equal to the resistance of the bottom. The bottom is now arrived at a state of permanency, at least for a considerable time; and the longer, according to the quality of the soil, clay and chalk resisting longer than sand or mud.

On the other hand, the water is continually wearing away the brims of its channel, and this with the more force, as, by the direction of its stream, it impinges more perpendicularly against them. By this means it has a continual tendency to render them parallel to its own course; and when it has arrived as near that as possible, it ceases to have any effect that way. At the same time that it has thus rectified its edges, it has enlarged its own bed; that is, it has lost of its depth, and consequently of its force and pressure: this it continues to do till there is an equilibrium between the force of the water and the resistance of its banks, upon which they will remain without farther mutation. And it is evident, from experience, that these equilibriums are all real, inasmuch as we find that rivers only dig and widen to a certain pitch.

The very reverse of all these things happens on other oc-

casions. Rivers, whose waters are thick and muddy, raise their bed, by letting part of the heterogeneous matters contained in them fall to the bottom: they also contract their banks, by a continual apposition of the same matter, in brushing over them. This matter, being thrown aside far from the stream of water, might even serve, by reason of the obscurity of the motion, to form new banks.

Now these opposite effects seem almost always to concur, and are differently combined, according to the circumstances, whence it is very difficult to judge of the result; yet must this combination be known very accurately, before any measures can be taken about rivers, especially as to the diverting of their courses. The Lamona, which emptied itself into the Po, being turned another way, to make it discharge itself into the Adriatic, was so altered, and its force so far diminished, after its waters were left to themselves, that it raised its bed a great height, by continual depositions of mud, till it became much higher than the Po, in its utmost accretions, and needed very high banks, or dykes, to keep it from overflowing.

If various causes of resistance to the motion of flowing waters did not exist, such as the attraction and continual friction of the bottom and sides, the inequalities in both, the windings and angles that occur in their course, and the diminution of their declivity the farther they recede from their springs, the velocities of their currents would be accelerated to twelve, fifteen, and, in some cases, even to twenty times more than they are at present in the same rivers, by which they would become absolutely unnavigable.

A little river may be received into a large one, without either augmenting its width or depth. This seeming paradox arises hence, that the addition of the little river may only go towards moving the waters, before at rest near the banks of the large one, and thus augmenting the velocity of the stream, in the same proportion as it does that of the quantity of water. Thus the Venetian branch of the Po swallowed up the Ferrarese branch, and that of Panaro, without any enlargement of its own dimensions. And the same may be concluded proportionably of all other accessions to rivers, and, in the general, of all new augmentations of water.

A river offering to enter into another, either perpendicularly, or in an opposite direction, will be diverted by degrees from that direction, and obliged to make itself a new and more favourable bed towards the mouth.

The union of two rivers into one makes the whole flow the swifter, because, in lieu of the friction of four shores, they have only two to surmount; and that the stream, being farther distant from the banks, goes on with the less interruption; besides, that a greater quantity of water, moving with a greater velocity, digs deeper in the bed, and of course retrenches of its former width. Hence also it is that rivers, by being united, take up less space on the surface of the earth, and are more advantageous to low grounds, which discharge their superfluous moisture into them, and have likewise less occasion for dykes to prevent their overflowing.

These advantages are so considerable, that S. Guglielmini thinks them worthy of nature's having had a view to them in her contriving to make the confluences of rivers so frequent as we find them.

Such were the views and deductions of this author, in which he has been followed by several mathematicians of the first eminence; but certainly without coming to any very accurate and established principles, on which to found a computation of the quantity of water that would be discharged, in any new case that presented itself for determination;

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tion; or what slope, and what magnitude of current, was necessary for producing any required supply. Thus, a small aqueduct, which was carried to Paris in the beginning of the last century, on a plan presented to the academy, and, with some alteration, approved of by that learned body, was found, when completed, to yield very little more than half the quantity of water which they had computed. A similar circumstance happened at Edinburgh, when that city was supplied by water, under the direction of Defaguliers; the quantity of water actually furnished being only about one-sixth of the quantity which he had computed it would be, and but one-eleventh of what Maclaurin had estimated it at from the same plan.

Nothing can shew more clearly the inadequacy of the theory, as it existed at that time, than that the first mathematicians of their age, and we might almost add of any age, should differ so widely from each other; the estimate of the one being but about one-half of the other, and the nearest to the truth not agreeing with the actual supply by five parts out of six.

It required but a few instances of this kind to point out the necessity of a more precise and definite theory; and the subject was accordingly soon after undertaken by Michelotti at Turin, the abbé Bossut at Paris, and by the chevalier du Buat; of whom the latter is generally admitted to have met with the most complete success. Michelotti made a great number of experiments, both on the motion of water in pipes and in open canals. They were performed at the government expence, and nothing was spared to render them complete. A tower of fine masonry was built, to serve as a vessel from which the waters were to issue, through holes of various sizes, and under various pressures, from 5 feet to 22 feet. The water was received into basons constructed of masonry, and accurately lined with stucco, and of various forms and declivities. These experiments on the expence of water through pipes are, of all that have yet been made, the most numerous and exact, and may be appealed to on every occasion. Those made on open canals are still more numerous, and are no doubt equally accurate; but they have not been so contrived as to be so generally useful, being mostly very unlike the important cases which will occur in practice; and they seem to have been contrived chiefly with a view of overturning or establishing certain received hydraulic principles of that time. The experiments of Bossut are also very numerous, and of both kinds, viz. on pipes and canals; some particulars of which will be found under our article DISCHARGE of Fluids. But those of the chevalier du Buat are the most conclusive, and his theory of rivers the most perfect of any with which we are yet acquainted. A few of the leading principles of this author's theory will be found in the subsequent part of this article.

It is certain that the motion of open streams must, in some respects, resemble that of bodies sliding down inclined planes, perfectly polished; and that they would accelerate continually, were they not obstructed: but they are obstructed, and frequently move uniformly. This can only arise from an equilibrium between the forces which promote their descent and those which oppose it. Hence M. Buat assumes his leading proposition, viz.

1. "When water flows uniformly in any channel or bed, the accelerating force, which obliges it to move, is equal to the sum of all the resistances which it meets with, whether arising from its own viscosity, or from the friction of its bed."

From this proposition, ingeniously combined with the re-

sult of his own and Bossut's experiments, he then draws these fundamental propositions, viz.

2. "The motion of rivers depends entirely on the slope of their surfaces.

3. "Since the velocity of the water depends wholly upon the slope of the surface, or of the pipe through which it is conveyed, it follows that the same pipe will be susceptible of different velocities, which it will preserve uniform to any distance, according as it has different degrees of inclinations; and each inclination of a pipe, of given diameter, has a certain velocity peculiar to itself, which will be maintained uniform to any distance whatever. But this velocity changes continually, according to a certain function of its inclination for all degrees between its vertical and horizontal positions."

It is obvious that, considering the number of causes that may give rise to inequalities in the motion of water, whether in pipes or canals, it would have been vain to attempt the determination of the function above-mentioned from theory only: the results of the several experiments were, therefore, examined with the most scrupulous attention, and penetrating ingenuity, and from which at length the author derived the following theorems, viz.

Let V be the velocity of the stream, measured by the inches it moves over in a second; R a constant quantity, viz. the quotient obtained by dividing the area of the transverse section of the stream, expressed in square inches, by the boundary or periphery of that section, minus the breadth of the stream, expressed also in inches, viz. $R = \frac{w b}{b + 2 h}$; where w is the mean width of the section, b the mean height or depth, and h the breadth at bottom.

The line R is called by du Buat the *radius*, and by Dr. Robison the *hydraulic mean depth*.

Lastly, let S be the denominator of a fraction, which expresses the slope, the numerator being unity; that is, let it be the quotient obtained by dividing the length of the stream, supposing it extended in a straight line, by the difference of level of its two extremities; or, which is nearly the same, let it be the co-tangent of the inclination or slope.

Then the general formula expressing the velocity V , supposed uniform, is,

$$V = \frac{307 \sqrt{R - \frac{1}{10}}}{\sqrt{S - \frac{1}{2} h \cdot \log. (S + \frac{1}{10})}} - \frac{1}{10} \sqrt{R - \frac{1}{10}}, \text{ or}$$

$$V = \sqrt{R - \frac{1}{10}} \times \left(\frac{307}{\sqrt{S - \frac{1}{2} h \cdot \log. (S + \frac{1}{10})}} - \frac{1}{10} \right).$$

But when R and S are both very great, then,

$$V = \sqrt{R} \left(\frac{307}{\sqrt{S - \frac{1}{2} h \cdot \log. S}} - \frac{1}{10} \right) \text{ nearly.}$$

Hence it follows, that the slope remaining the same, the velocities are as R , or as the area of the section divided by its perimeter, minus the breadth of the river at the surface, very nearly; for they are as $\sqrt{R - \frac{1}{10}}$; and when the river is large, the \sqrt{R} may be used without any sensible error.

Again, if R is so small, that $\sqrt{R - \frac{1}{10}} = 0$, or $R = \frac{1}{10}$, the velocity will be nothing, which agrees very well with experiments; for in a cylindric tube $R = \frac{1}{2}$ the radius; the radius, therefore, is only two-tenths, so that the tube is nearly capillary, and the fluid will not flow through it.

RIVER.

The velocity may also become nothing, by the slope becoming so small, that

$$\frac{307}{\sqrt{S - \frac{1}{2}h \cdot \log. (S + \frac{1}{2})}} - \frac{1}{v} = 0;$$

but if $\frac{1}{S}$ is less than $\frac{1}{50000}$, or than $\frac{1}{1000}$ th of an inch to an English mile, the water will have sensible motion.

In a river, the greatest velocity is at the surface, and in the middle of the stream; from which it diminishes towards the bottom, and the sides, where it is the least. It has been found, from experiment, that if, from the square root of the velocity in the middle of the stream, expressed in inches per second, unity be subtracted, the square of the remainder is the velocity of the bottom.

Hence, if v be the velocity in the middle of the stream, the velocity of the bottom will be expressed by $(\sqrt{v} - 1)^2 = v - 2\sqrt{v} + 1$.

The mean velocity, or that with which, were the whole stream to move, the discharge would be the same as the real discharge, is equal to half the sum of the greatest and least velocities, as computed in the last proposition. Therefore, if v represents the greatest velocity, then will the mean velocity $= v - \sqrt{v} + \frac{1}{2}$.

Suppose that a river, having a rectangular bed, is increased by the junction of another river equal to itself, the declivity remaining the same; required the increase of depth and velocity. Let the breadth of the river $= b$, the depth before the junction d , and after it x ; and, in like manner, v and v' the mean velocities before and after; then $\frac{bd}{b+2d}$

$$= R \text{ before, and } \frac{bx}{b+2x} = R' \text{ after, so } v = \frac{307 \sqrt{R}}{\sqrt{S}},$$

supposing the breadth of the river to be such, that we may reject the small quantity subtracted from R ; and, in like manner, $v' = \frac{307 \sqrt{R'}}{\sqrt{S}}$; then substituting for R and R' ,

$$\begin{aligned} \text{we have } v &= \frac{307}{\sqrt{S}} \times \sqrt{\frac{bd}{2d+b}}, \text{ and} \\ v' &= \frac{307}{\sqrt{S}} \times \sqrt{\frac{bx}{b+2x}}. \end{aligned}$$

Multiplying these into the area of the sections bd , bx , we have the discharges, viz.

$$\begin{aligned} bdv &= \frac{307}{\sqrt{S}} \times \frac{bd \sqrt{bd}}{\sqrt{(b+2d)}}, \text{ and} \\ bxv' &= \frac{307}{\sqrt{S}} \times \frac{bx \sqrt{bx}}{\sqrt{(b+2x)}}. \end{aligned}$$

And since the last of these is double the former, we obtain

$$\frac{bx \sqrt{bx}}{\sqrt{(b+2x)}} = \frac{2bd \sqrt{bd}}{\sqrt{(b+2d)}}, \text{ or } \frac{x^3}{b+2x} = \frac{4d^3}{b+2d},$$

$$\text{whence } x^3 - \left(\frac{8d^3}{b+2d}\right)x = \frac{4bd^3}{b+2d},$$

a cubic equation solvable by the formula of Cardan. As an example, let $b = 10$ feet, $d = 1$, then $x^3 - \frac{8}{3}x = \frac{4}{3}$, where $x = 1.4882$, which is the depth of the increased river. Hence we have $1.4882 \times v' = 2v$, and $1.4882 : 2 :: v : v'$; or v is to v' as 37 to 50 nearly.

When the water in a river receives a permanent increase,

the depth and the velocity, as in the example above, are the first that are augmented. The increase of the velocity increases the action on the sides and bottom, in consequence of which the width is augmented, and sometimes also, but more rarely, the depth. The velocity is thus diminished, till the tenacity of the soil, or the hardness of the rock, affords a sufficient resistance to the force of the water; the bed of the river then changes only by insensible degrees, and, in the ordinary language of hydraulics, is said to be permanent, though, in strictness, this epithet is not applicable to the course of any river. For more on this subject, see Du Buat, "Principes d'Hydrauliques," in two vols. 8vo. Paris, 1806; Bossut's "Hydrodynamiques;" the article *River* in the "Encyclopedia Britannica;" and Playfair's "Outlines of Natural Philosophy."

The best and most simple method of measuring the velocity of the current of a river or canal, is the following. Take a cylindrical piece of dry, light wood, and of a length something less than the depth of the water in the river; round one end of it, let there be suspended as many small weights as may be necessary to keep up the cylinder in a perpendicular situation in the water, and in such a manner that the other end of it may just appear above the surface of the water. Fix to the centre of that end which appears above water, a small straight rod, precisely in the direction of the cylinder's axis; to the end, that when the instrument is suspended in the water, the deviations of the rod from a perpendicularity to the surface of it, may indicate which end of the cylinder advances the fastest, by which may be discovered the different velocities of the water at different depths; for if the rod inclines forwards, according to the direction of the current, it is a proof that the surface of the water has the greatest velocity; but if it inclines back, it shews that the swiftest current is at the bottom; if it remains perpendicular, it is a sign that the velocities at the surface and bottom are equal.

This instrument being placed in the current of a river or canal, receives all the percussions of the water throughout the whole depth, and will have an equal velocity with that of the whole current from the surface to the bottom at the place where it is put in, and by that means may be found, both with ease and exactness, the mean velocity of that part of the river for any determinate distance and time.

But to obtain the mean velocity of the whole section of the river, the instrument must be put successively both in the middle and towards the sides, because the velocities at those places are often very different from each other. Having by this means found the difference of time required for the currents to run over an equal space; or, the different distances run over in equal times, the mean proportional of all these trials, which is found by dividing the common sum of them all by the number of trials, will be the mean velocity of the river or canal.

If it be required to find the velocity of the current only at the surface, or at the middle, or at the bottom, a sphere of wood, of such a weight as will remain suspended in equilibrium with the water, at the surface or depth which we want to measure, will be better for the purpose than a cylinder, because it is only affected by the water of that sole part of the current where it remains suspended.

It is very easy to guide both the cylinder and the globe in that part which we want to measure, by means of two threads of small cords, which two persons must hold and direct, one on each side the river; taking care at the same time neither to retard nor accelerate the motion of the instrument.

Having

RIVER.

Having the mean or medium velocity of a river, if we multiply this medium, the breadth, depth, and space run over in a certain time, the product will give the quantity of water that flows down in that time. Dr. Halley, in order to estimate the quantity of water that flows into the Mediterranean sea by means of rivers, makes a comparison of the great rivers of Italy, &c. with that of the Thames. (Philos. Transact. Abridg. vol. ii. page 110.) He assumes the breadth of the Thames at Kingston bridge to be 100 yards, its depth three yards, and velocity two miles *per* hour. He professedly overrates the dimensions, in order to allow more than a sufficiency for the streams received below Kingston. This assumption gives the area of a transverse section of the river = 300 square yards, and the quantity of water flowing down = 20,300,000 tons in a day. This must be overrated by at least, it is supposed, one-third. If the breadth be assumed 100 yards, the depth three, and velocity two miles *per* hour, it will then give two-thirds of the result above-mentioned; or it will amount to the same thing if we take one-eighth part from all the three data assumed by Dr. Halley, the result being two-thirds of that above; amounting in the year to 166,624,128,000 cubic feet, which is a little more than one-twenty-fifth part of all the rain and dew in England and Wales in a year, as above deduced. Mr. Dalton has estimated "that the water of the Thames is drawn from an extent of country of about 600 square miles, or one-eighth of the area of the whole, nearly. The Severn, including the Wye, spreads over an equal or greater extent of country; and that collection of rivers which constitutes the Humber is superior to either of the other two in this respect. As far as my own observation goes, the Severn and Wye must disembody as much or more water than the Thames; the Humber I have not seen collectedly, but have noticed most of the branches constituting it, and should apprehend it cannot be inferior to the Thames: all other circumstances being the same, the quantity of water carried down by any river should be as the area of the ground from which the water is derived, and on this account the Humber ought to exceed the Thames.

"The Severn, which is partly derived from the mountainous country of Wales, is certainly the most rapid of the three rivers, and probably carries down the most water; as the Thames, however, is generally considered to take the lead, we will suppose, upon the whole, that these three rivers are equal in this respect.

"The counties of Kent, Suffex, Hampshire, Dorsetshire, Devonshire, Cornwall, and Somersetshire, from the Medway to the Lower Avon inclusively, in an extent of 11,000 square miles, do not present us with many large rivers. From their number and magnitude, we cannot form a high estimate of their produce. The quantity of rain for those counties is indeed near the average for the kingdom, as far as the preceding observations determine; but the milder temperature of their winters and greater heat of their springs and summers, will cause a greater evaporation than in some other parts: it is probable the rivers in these counties may amount, when taken together, to $1\frac{1}{2}$ times the magnitude of the Thames. The rivers that disembody their waters on the coast of Lincolnshire, Norfolk, Suffolk, and Essex, from the Humber to the Thames, though drawn from a country of 7000 square miles, manifestly fall far short of the Thames. The two places in this district, for which we have accounts of the rain, Norwich and Upminster, give a mean of only $22\frac{1}{2}$ inches annually. This, with the flatness of the country, which prevents the water from running off in some degree, makes the rivers much

less than what might otherwise be expected from the extent of ground. There are but three or four of any consequence. Probably all the rivers may amount to half the size of the Thames. There remains above 6000 square miles in Wales, from the Wye to the Dee, inclusive of the last, and the northern counties of Lancaster, Westmoreland, Cumberland, Northumberland, and Durham, with part of Cheshire, and a small part of Yorkshire, from the Mersey round by the Tweed to the Tees, amounting to 7000 or 8000 square miles, to be estimated.

"These two divisions, though not larger than some others, abound in rivers, many of which are considerable in magnitude and of great rapidity. The rains at an average, it is probable, are double what they are in the S.E. counties of the kingdom. The rivers in these two districts cannot fairly be estimated, I think, at less than four times the Thames. It appears, then, that by this estimation, the water carried off by all the rivers in England and Wales, may amount to nine times that carried off by the Thames = 13 inches of rain. There remains still sixteen times the water of the Thames, or 23 inches of rain to account for, before we have disposed of all the rain and dew."

This ingenious philosopher concludes, from a detail of facts and reasoning, that "the rain and dew of this country are equivalent to the quantity of water carried off by evaporation and by the rivers. And as nature acts upon general laws, we ought to infer, that it must be the case in every other country, till the contrary is proved.

"This conclusion being admitted, we are enabled to deduce a general theorem for the quantity of water carried down into the sea by any river in any country (on the supposition that all rivers are ramified alike) provided we have certain data; these data are the length of the river, and the excess of the rain above the evaporation in the country from which the water of the river is drawn; also, it should be known by observation, how much water some one given river carries down.

"For, from the principles of geometry, the area of country from which any river is supplied, will be as the square of the length of the river; and the quantity of water carried off, will be in the compound ratio of the area of the country, and the excess of the rain and dew above the evaporation.

"Thus, let L = the length of any river, E = the excess of rain and dew above the evaporation, and Q = the quantity of water disembodyed in any given time by that river; l = the length of any other river, e = the excess, &c. and

q = the quantity of water; then we shall have $q = \frac{Q l e}{L E}$.

"*E. gr.* Suppose the length of the Thames = 200 miles, and the excess = 5 inches, estimating the rain and dew at 30 inches, and evaporation at 25; and suppose the river Kent, in Westmoreland, to be 20 miles in length, and the excess 35 inches, the rain and dew being supposed 65, and evaporation 30 inches. Then,

$$\frac{20^3 \times 35 \times Q}{200^3 \times 5} = \frac{7Q}{100} = q,$$

or $Q = 14\frac{2}{3} q$; which result, I believe, will be found to accord nearly with the measurement of the two rivers on the principle before-mentioned." Manchester Memoirs, vol. v. pt. 2.

RIVER, with regard to *Agriculture*, may be converted, in many situations, to various useful purposes, such as those of improving the meadow and other grass-lands which lie below the sources of them, by having their waters in particular seasons turned over them. By proper attention in these

these respects, vast benefits might, in a variety of cases, where it has never been even so much as suspected, be derived, and thereby immense savings in manure be made for the amelioration of the less favourably situated lands. But besides this vast source of advantage, rivers may often be converted, with little trouble or expence, to other useful purposes, such as the supplying of live-stock with water, the turning of different kinds of farming machinery, the conveying of cattle food, and manures of various descriptions, as well as different sorts of farm produce, and a great number of other uses, which can only be discovered by the particular circumstances of them, and those of their situations. But though in these views they may be justly considered as of much advantage, in others they are often dangerous, troublesome, and highly detrimental to the farmer, as where they are much accustomed to overflow their banks, injure the crops, sweep away the live-stock, and carry down much of the lands on their borders. Where they are apt to prove hurtful by thus overflowing their banks, the best modes of confining them in particular cases have been pointed out in speaking of the nature of embankments and haugh-land. See **EMBANKMENT**, and **HAUGH-Land**.

There are, however, other cases that deserve to be considered in this place, such as the directing and altering the courses of torrents coming from mountains, changing the courses of rivers, securing the banks of rivers in vallies, and straightening the narrow, crooked windings of small rivers in the same situations, and other hollow parts of lands. By the first of which much advantage may, in different circumstances, be procured, and great security be attained for the valuable lands below. By the second, extensive tracts of the most valuable kinds of land may be obtained, while the whole is rendered more safe and proper for the purposes of pasturage or those of tillage. By the third, much useful land may be secured, as well as much mischief from the high floods be guarded against. And as by the last much ground is often lost, or rendered of but trifling value to the farmer, by proper means these inconveniencies may be obviated, and the land rendered of much greater utility. Besides these, the methods of securing the banks, in other instances where they are liable to be carried away by large floods, may also prove a vast benefit and improvement.

In the former of these cases, the remedies are, in general, those of rendering their courses more *free, open, straight, and regular*, by which they must obviously suffer less obstruction, and of course be less apt to overflow their banks, and prove injurious to the grounds below, or on the sides of them. It is, however, remarked, that this is a sort of work that ought to be maturely considered in all cases before it is attempted; but that in such upland situations the business may often be performed with facility by small cuts made along the flat bases of such elevations, while it is very different in those of straightening vale rivers, as much larger openings are requisite. Besides, shallows for piers and stops are mostly found there, while in these cases they are in general wholly wanting. But in all cases, and in every point of view, the business is evidently of the greatest interest to the proprietors of land, as the destruction produced in this way is not only often committed on the most valuable sorts of land, but is frequently the cause of disputes between the neighbouring proprietors; this sort of work has, however, been little attended to, and is in common very imperfectly understood. In many instances a great deal may be effected by proper accommodation between the different proprietors, whose interests are affected.

But in undertaking works of this nature, there are different circumstances that require to be particularly con-

sidered. The peculiar site or place of improvement should, Mr. Marshall says, be well studied, in order to fix upon the best method of executing the work. And when this has been done, accurate plans and estimates of the expence that may be incurred, as well as of the gross profits that may result from it, be made out with care. And it is advised that, where the business is extensive, and the person who has the management not perfectly acquainted with the nature of it, to contract with proper experienced labourers, or a responsible undertaker, for the execution of the whole, binding the party who is to perform the work to uphold it for a certain number of years after it is finished. It is remarked, that for want of these precautions, sums of money are annually expended, and in great part thrown away, so as to become, in some instances, a heavy tax upon estates, and a serious devaluation of timber. It does not follow, it is contended, that, because a few square yards of land are annually carried away, an expensive work should be erected, and upheld at ten times the value of the ground it will protect; nor that, because one side of a river is slightly injured, an over-sized work should be raised to the greater injury of the opposite banks. It will be found, it is observed, that in ordinary cases, opposite proprietors have one and the same interest; and that small injuries may generally be remedied by simple means, and at a small cost. What the writer is solicitous to inculcate is, that the remedy ought to be proportionate to the disease; and that it should be applied in such a manner as not to injure another: consequently, that it behoves a proprietor to see that no one about him has an interest in erecting expensive and abortive works, or any prospect of advantage from the annoyance of his neighbour in any respect from such works. It is added, that every person has an undoubted right to defend his property. It is often his duty, as well as his interest, to do it. And that there are cases on which even large sums of money may be prudently laid out, and ought to be expended in order to accomplish the work; as by neglect great injury may be sustained, which at first might have been remedied at a very trifling cost.

Rivers, wherever they are properly situated, should always be converted to the use of watering the grass lands which lie below their levels. See **WATERING of Land**.

RIVER-Banks, *Securing of*, the means of guarding and protecting them from the encroachment and injury of the streams when in flood or otherwise. It is a work of much difficulty and labour in many cases, and that requires the careful management of an experienced director. It is indeed remarked by the author of the Treatise on Landed Property, in speaking of the nature of this business, that supposing the uniform, and evenly-poised, current of a reach or straight part of a river to be disturbed by the body of a large root of a tree, or any other matter, brought down and lodged by a flood, on this side, which, in brooks and narrow rivers, is an ordinary cause of mischief, it is found that through this apparently trifling incident the current may be said to lose its balance. For, when the flood falls to the level of the obstruction, the water becomes confined in that part; its height, above the obstruction, is consequently increased; and its current opposite and below it not only accelerated, but gently turned from its direct course toward the opposite bank of its natural channel; which, if it be of an earthy crumbling nature, becomes undermined: the land, or upper part of the bank, consequently shoots down, and is carried away by succeeding floods. And what tends to increase the evil is, the circumstance of the channel, immediately below the obstruction, becoming occupied, even in minor floods, with comparatively stagnant water. It is in consequence,

quence warped up with the sediment there deposited; and by this means an additional weight of water is thrown against the opposite bank; which, if the growing cause of mischief be not speedily removed, will in a short time be much torn away, and, in a course of years, a bend or bay be formed in the adjoining ground of the proprietor, nearly opposite to the root or other body, with a corresponding bank of sand or gravel, united with and becoming part of the lands on this side. But if the grounds, on this side, are equally vulnerable as those of the opposite neighbour, there is no cause of exultation in the increase of territory. For while the current is leaving the proprietor on this side, perhaps a worthless sand-bank near the obstruction is, by a natural law of river-currents, scooping out a bay below, and giving to his opposite neighbour an increasing territory in that part. And thus a natural loss of valuable land is incurred on each side; and the evil (in this case) continually increasing; until the banks are securely defended, or the current is restrained, and directed into its former channel. The remedies in this case are two; first, to sheath the injured banks of the bays on both sides, with such materials as will resist the circuitous current, and let the river remain in its crooked state; and, secondly, to erect a pier at the higher point of the bend on the opposite side of the river, to parry off the force of the current from the bank of it, and direct it forward; with the twofold intention of preventing further mischief, and of bringing back the course of the river to its former state of straightness, as much as possible.

It is likewise stated, that the operation of guarding the immediate bank of a sharp river-bend against a heavy current, meeting with great resistance, is generally a work of much difficulty and expence, even where materials can be easily procured; while that of diverting the current may frequently be accomplished at a comparatively small cost; and its effect be rendered infinitely more salutary and permanent. As it is evident that, if the accidental obstruction mentioned had been timely removed, no bad effect would have ensued, and the river would have continued its direct course. Or if, through neglect, it had been suffered to remain awhile, until its mischief was discoverable, even then, if it had been moved from its station to the opposite side of the river, and placed in the part affected, this small counterpoise might have recovered the balance of the current, and directed it into its wonted channel. And in almost any case, he thinks, by judiciously placing, in a similar manner, an obstruction proportioned to the magnitude of the power to be counteracted, the like effect may be produced. As, for instance, if, in the case proposed, the pier or river-guide above-mentioned were to be erected by the proprietor on the opposite side of the river, and to be inclined towards the stream, or direct course of the river, in a degree proportioned to the strength of its current (a rapid current requiring less bias than a slow one), and of a size in like proportion, not only the banks of the bay or bend would be defended, in a great degree, from the action of floods, but the sand-bed formed on this side would be worn away, and its materials deposited in the bay on the other side; which also being rendered stagnant, comparatively, with the current of the river, would receive the deposits of foul waters in times of floods; and thus, in a twofold manner, be refilled and brought back toward its former state. And, further, that if, when the gravel bank on this side is sufficiently removed, the proprietor on the same side were to erect a similar pier at the higher point of the bend on the same side, the sand or gravel bank on the other side would, in like manner, be worn away, the bay on this side be returned to its original

proprietor, and the straight course of the river be regained; then the piers ought to be removed, whether they belong to one or two proprietors; the latter having generally a mutual interest in directing the river, which separates their properties, into a straight course, as much as can be done.

It is stated, that in the construction of a river-guide for this purpose, there are certain principles and particulars of practice to be observed. It is suggested that its position should be such as to produce the required effect, with the least degree of resistance. For the current of a river, as the waves of the sea, ought to be subdued by stratagem rather than by force. Resistance serves but to increase their fury. A wave falling on a flat shore, seems to die without a struggle; while one that is stemmed by an abrupt rock strikes with tenfold force. And, in like manner, a rapid river will glide smoothly along the side of an even bank, though it may somewhat deviate from the direct course; without perceptibly disturbing the current, or injuring the bank that directs it, even though merely of turf. But when a strong current meets with an abrupt projection, or a sharp bend in its channel, its fury is roused. There, rock is sometimes barely sufficient to resist its force. On these principles it is, therefore, conceived, that in erecting a pier with this intention, it ought to be made to unite evenly with the natural bank of the river above it, and, where the required deviation from a straight line is considerable, the face of the pier ought to pass off from the natural bank with a smooth hollow curve, that the force of the current may not be checked. But its outer or lower end should be straight, or nearly so, and be directed, as a piece of ordnance, to the object it is intended to destroy—to the obstruction it is intended to remove; and it may be observed, that the nearer it approaches this, the greater will be the action of the current upon it, in times of flood; and the less liable the stream will be, at low water, to turn back into its former channel. For, in cases of this kind, the current of a flood, and that of low water, (if not better directed,) take different courses, according to their heights and strengths. The one rushes forward in the direction desired, the other, unable to surmount the obstruction, and flagging for want of strength at the point of the pier, doubles it; and falls back into the bay with an accelerated current; directed, perhaps, straight to the injured bank; and may thus increase, perhaps, rather than prevent, the injury. But in order to remedy this evil effect, and to direct the current, at every height, into the same channel, it will generally be found right, where it can be done, and at a reasonable expence, to cut a channel through the obstructing bank, large enough to admit the stream at low water; depositing the materials which are raised in doing it at the point of the pier, and against the foot of the injured bank: by these means not only preventing further injury to the lands on the opposite side, but greatly assisting the action of the flood-currents to force their way through the channel, and enlarge it; and, in a short time, lay open the required course. For although, by this procedure, the bay on that side might not be so readily and completely filled up, as it would by suffering the current to throw back the obstruction, by degrees, in the manner above represented; yet the advantage of putting an immediate stop to the ravages both of floods and of low water, might counterbalance that defect; even though the pier were thereby rendered necessary to be kept up in perpetuity. The expence of the cut may generally be saved in the required length of the pier; whose use, in this case, is, merely that of giving an easy bend to the current; so as to enable it to find its own way

to the channel prepared for it. And the *strength* required, depends upon the weight of water, the force of the current, and the angle of deviation from the given direction of the current immediately above. If the required direction of the pier be nearly the same as that of the current above it, it has, it is contended, little more than the weight of water to sustain. Whereas a jutment run out, abruptly, into the natural course of the current (as is commonly seen), has not only the weight, but the force, of the water to withstand; and requires threefold, or tenfold, the strength of structure that is necessary in the other case. Another circumstance to be particularly regarded in this sort of business, is the height of the conductor. Where it is run out from the bank into the channel of the river, in rather a straight manner, and if it be not raised high enough to prevent the waters of floods from making their way over it, its foundation may be endangered; especially in a place where the general fall of the river is considerable. For an overfall of water, unless it have a firm basis to act upon, naturally scoops out a pit at the foot of the fall; and undermines the precipice it tumbles over; seldom failing to let down such as are constructed by art.

With respect to the means of obviating this effect, they are three, one of which is to raise the pier high enough to prevent the overfall; an expedient, however, which cannot always be practised with propriety. Another is to form the lower side, or back part of the pier, with a shelving or flatly inclining surface, to break or elude the fall. And the other, to prepare a convex floor behind the pier, for the waters to fall upon. This last has been found successful in the writer's own practice. There is likewise another point that demands particular care in the operation, which is that of securing the point or outer end of the pier, not only at the foundation, but in the superstructure. For although the main current cannot, if the pier is judiciously placed, exercise its strength upon this part; yet, by reason of the weight of water there losing its support, and part of it, consequently, rushing precipitately into the unguarded bay, the lower end of the pier is peculiarly exposed to danger in that way. It is supposed scarcely necessary to add, that the *upper* end of the pier ought to be deeply inserted in the firm bank of the river, to prevent the current from insinuating itself behind the facing, or that the face of the pier should be carried up with a sufficient batter, to give it firmness; or that the *foundation* ought to be securely laid, and to be kept sedulously guarded in front, to prevent its being undermined by the current. Rough stones, thrown down loose, and with a flat shelving surface, against the foot of the pier, are, in most cases, the best guard, let its materials be of what sort they may.

It is advised, that the materials for this use should be suited to its occasion, where a choice is to be had. If a low defence, only, is wanted, in a district where large rough stones are plentiful, a long pile of loose stones, laid flatly sloping against the bank of the river, or a flat ridge run out from it, may form a cheap and durable barrier. For should they be disturbed by an extraordinary flood, they may be readily replaced when the water subsides. Where a tall pier is required to direct a large and rapid river, in a place where stones and strong cement may be procured at a moderate expence, masonry may be eligible. But in exposed situations, at least, it ought to be guarded with timber, especially at the top and the outer end (as the piers of sea-ports, and the quays of navigable rivers, are guarded), to defend those parts from injury by ice, timber, or other large floating bodies, driven

against them in times of flood. And that where masonry cannot be used, but at a great expence, a *caisson*, formed with posts and planks of adequate dimensions, and filled with pebbles, gravel, or other indissoluble materials, to give stability to the fabric, may be found to last as long as its services may be wanted; and, in some cases, may be removed while its materials may yet be valuable.

But this, though the prevalent method, is merely palliative, and demands frequent repairs: it does not cure the evil, or bring back the lost property to the owner who has a right to it. Nor is it in such a case beneficial to a rival owner, for the current, as has been shewn, sweeping circuitously along the banks of the bay, is thereby led to direct its force against the lands of the proprietor on this side, who cannot, under these circumstances, defend them by the above means; but who must either secure them by a lengthened land-guard, or leave them at the mercy of a sweeping current. It is therefore concluded, that, in a case of this kind, it is evidently the best interest of an opposite proprietor to suffer his sand-bank, or gravel-bed, to be cut through, in the manner suggested, and that he ought to assist in the operation; as he will thereby not only get rid of the circuitous current, but, by the action of the floods, in the straightened course, his bay will scarcely fail to be filled up with the scattered materials that may be removed.

There is another case in which this sort of pier or river-guide may be made use of with success; which is that where a stream of the above description falls down a crooked valley, and necessarily takes, at certain points, a winding course.

In this case, where the quantity of water is considerable, its fall rapid, and especially where it is conducted to the bend on the farther side down a straight, unobstructed reach, scarcely any thing but natural rock can resist its force in that part. In such situations it is not unusual to see earth-banks scooped out and undermined, until a perpendicular cliff of twenty or thirty feet high be formed. But if a pier be erected at the upper part of the bend, with an easy curve from the natural course above, so as to *bend* the current without *breaking* it, and direct it into its natural channel, in the valley below, it will have nothing to contend with but the loose gravel beds on the different sides, which, if cut through, as in the former case, will presently be torn away, and a principal part of their materials be deposited in the bays on each side, but especially in the latter, or that on this side: so that in this, as well as in that case, both sides of the river may be benefited by the alteration which is thus produced. It is however stated, that there are cases in which nothing but an immediate sheath, or *land-guard* applied to the injured part, can be properly used to prevent further depredations. As, first, where the river is confined in the part where it is required to be bent, by rocks or otherwise, to an unaltered channel; as it frequently is in sub-alpine situations. And, secondly, where a deep pool occurs in that part at low water, so as to render it difficult to get a proper foundation for a pier. It is observed that, in the former situation, stones are generally plentiful; and they require to be applied according to the circumstances of the particular case. Where the foot of the injured bank is covered with a pool at low water, it is advised to shelve off the brink of the bank, and shoot down loose stones from the top of it; suffering them to form their own slope in the action of falling, and by the operation of succeeding floods; continuing to pour them down until the bank be secured, at least from minor floods; and then to

slope

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slope back the upper part, to give freedom to floods of higher magnitude. But that where it is in the face of an impetuous torrent, and at some little distance from it, a gravel bed is thrown up, so as to lie dry during low water; yet where lands, behind, are liable to the ravages of floods, as is often the case, and especially where stones are not plentiful, a more frugal arrangement of them may be made, by using them merely to case the exposed bank, so as to prevent the currents of floods from laying easy hold of it, and tearing away the land. However, in this case much depends on the plan and construction of a safeguard of this kind. It ought to be every way convex; so that the strength of the current and the weight of the water may act upon it, as superincumbent pressure acts upon an arch. It should bulge out, horizontally, towards the known current of floods, (without regard to the course of the stream at low water,) and the face of the wall ought to take the barrel form. A cross section of the stone-work should resemble a semi-arch, or, in dangerous situations, it ought, it is conceived, to fall back flatter than the quadrant pitch. For, in general, the flatter it is made to lie, the more secure it will become; but the steeper it is carried up, the fewer materials, and the less labour, it will require. And in forming a work of this nature, the foundation should be laid pretty deep, to guard against any accidental scoopings of the floods. The wall ought to be carried up dry, or without mortar, the stones being laid with their ends outwards, their inner ends pointing to the same centre, like those of an arch, and to be backed with gravel or earth, rammed in firmly behind as the facing is carried up. The *coping*, or uppermost course of the stones, should be securely bound with thick tough fods (eight or ten inches deep), whose surfaces, when beaten down, ought to lie even with that of the stone-work; and similar fods require to be laid, with a gentle rising slope, until they unite smoothly with the natural turf of the land to be defended: so that the waters of floods, when they rise above the stone-work, may have no abruptness to lay hold of, but may pass away smoothly over the surface of the land, as they commonly do over smooth green-sward, without injury. And, lastly, that the stones are to be beaten forcibly into the bank with a rammer, a mallet, or a small battering-ram adapted to the purpose; thus rendering the whole compact and firm to resist the current. Where vacancies or fissures still appear, long splinters of stone are to be driven in, as wedges, to increase the firmness, and prevent the current from tearing out an unguarded stone. It follows, in course, that the largest and longest of the stones ought to be used where the greatest resistance is known to be necessary, in order that the greater security may be attained. It is remarked that this sort of defence, like that of every other species of the river kind, requires to be attended to from time to time, especially after great floods. If the foundation be laid bare, it requires to be recovered with rough gravel, or with stones thrown loosely against it. If any of the facing stones be displaced, or loosened, they are to be replaced with others, or to be wedged in afresh. Or if the turf which binds them at the top be disturbed, the torn part should be cut out square, and be firmly and completely filled up with fresh turves. It is added, that this method of defence against rapid rivers originated in the ingenious writer's own experience and practice; and that, when compared with a wooden guard, it is cheap, fighty, and durable.

It is noticed further, that there are cases of other kinds, as those which are found in the skirts or margins in the valleys of mountainous situations, through the plains of which the rivers are found winding with devious courses, or tracing

the margins at the feet of the containing heights. In some instances, they are confined in deep-funk channels, whose banks they seldom overflow; but, much oftener, their channels are funk a few feet only beneath the general surfaces of the lands they pass through. Hence, in high floods, they may be said to be let loose over the plains, to ravage them at pleasure. Their immediate banks, however, are generally the victims of their rage. These they tear away, and ransack off their better parts; substituting beds of stones and gravel, or perhaps their own channels, in the stead of what were, a few hours before, valuable lands. And that there are instances of mountain torrents, on rushing out of their confined channels into flat vale districts, ravaging many acres during a single flood. And to confine or direct these, is, it is observed, often a business of vast difficulty and trouble.

In these cases, the best endeavour of the artist is generally, according to Mr. Marshall, to give the river a direct or straight-forward course, on its quitting its restraining channel, at its first entrance into the area of the plain; and, if no obstruction lies in the way, to continue the straight line to another retaining channel, at the lower end of the area to be improved. But that where the area is winding, or some obstruction rises within it, so that a straight line cannot be drawn from the entrance to the outfall, an insuperable difficulty may seem to frustrate this mode of improvement; as the current requires to be bent, not only after it has entered the plain, but after it has acquired an increase of velocity by moving in a straight course. By actual practice and experience, he was led by another circumstance belonging to it, to what may, perhaps, be considered as a principle, in conducting improvements of this nature. A straight cut into the middle was desirable: but the point of rising-ground rendered it impracticable. Near the centre of the flat, a large insulated fragment or islet of rock rose ten or more feet above the level of the area; and at the lower end of it, near the natural outlet of the river, a bank of rock had formerly been washed by it. It was easy to perceive that the insulated rock, which commanded both the extreme points of the area, might be employed in uniting them; and that, by the use of that rock the work might be rendered complete. For, by opening a straight course to the rock in the middle, and another from thence to the bank of rock at the outlet, the current would be directed, in another straight line, to the outlet, and the site of improvement be entirely freed from its injurious effects. He remarks, that it is in few instances that prominent rocks, firm enough to resist the current of an impetuous river, rise in the areas of river-worn plains. But that, on the sides of mountain vallies, rocks are common; and may, doubtless, in many instances, be employed to throw the river from side to side of a crooked valley, in straight reaches; as rays of light may be reflected in continuation by well-placed mirrors. Even where natural rock is not present, either in the area, or on the sides of such a plain, or flat-based valley, rising grounds may frequently be found within the former, and are never wanting on the sides of the latter. And, against these, artificial buttments, of sufficient strength, may not unfrequently be formed in alpine situations, where stones are generally plentiful, without any very great expence.

It is observed, in respect to the *altering the course* of a river or brook, that the difficulties and expence depend on the particular circumstances belonging to it. In a simple case, in which one straight cut only is required, the principal difficulty, and that which requires the best skill of the artist, lies in directing the current of the first flood out of the old into the new channel. But if a bend of the old channel,

like that just noticed in the above case, can be made use of, this difficulty may be said to vanish. The mouth of the new cut receives the current with a straight course; consequently, if it be made of sufficient capacity, the river in a flood can have no propensity left towards its old channel; and the loose materials which rise in forming the mouth of the new cut will generally be sufficient to turn the stream at low water into it. But if a suitable bend cannot be approached by the new cut, a directing pier, like that in the above case, will be required to bend the flood-current, and give it a straight-forward course into the new channel; a water-tight dam being formed between the point of the pier and the firm bank of the new channel, to prevent the water from regaining its former course or direction.

But in regard to the cutting of the new channel, it is merely a work of manual labour; being attended with no other difficulty than what may arise from the expence; which will depend on the size of the river, the nature of the ground to be cut through, and the value of labour in the given district. It is mostly to be ascertained with sufficient accuracy, by previous calculations. And it is added that the required size of the new cut is small compared with that of the old channel. For the currents of floods, by carrying off the earthy particles with which they come in contact, will soon enlarge it. It is nevertheless right to give ample room in the new channel, lest the first flood should prove high, and, by bursting its bounds, force its way back to its former course. Therefore, in order to give the required capacity to the new channel, and to allow for its widening, the materials which arise in making it ought to be formed into regular embankments on either side of it, and at sufficient distances from its brink, to obtain the above purposes; and, moreover, to protect the adjacent lands from the injurious effects of unrestrained floods. And it is further suggested, that a new river course requires to be carefully attended to, during a few years after it is opened, to see that its channel preserves its straightness, and that no breaches are made or threatened in its banks. And that, considering the uncertainty of extraordinary floods, it cannot be said to be out of danger in less than three years. Of course, in contracts for these works, in these cases they should be upheld for that time, and then delivered up in the state fixed upon in the agreement.

There are still other cases of rivers in lowland situations, where the currents of them are generally sluggish, and their beds deep sunk and narrow, with few shoals or firm bases on which to found piers or bulwarks, and few stones with which to raise them; and even if erected, the sluggishness of the current may render them ineffective. In these cases the banks are steep, and often of the tenderest earths, liable to the slightest attacks of agitated water, especially near their feet, where they are naked of vegetable covering. Hence, it is from the frettings of the minor floods, or the waves of the dead water which occupies the channel of a river of this description, that its banks are worn away; especially at a bend which faces a length of reach, in which the waves have room to rise. These fretting against the foot of the bank undermine it. The face of the bank, in consequence, shoots down; and the prostrated soil is dispersed by the next flood. It is consequently observed, that the most essential work, in a case of this kind, is to guard the foot of the bank up to the level, and somewhat above the level of low water. And, this done, to slope back, smoothly, the upper part of the bank, to enable it the better to support a vegetable covering, and withstand the attacks of higher floods, as well as to render it less dangerous

to pasturing flock, and enlarge their field of pasturage. And that when, with the increase of capacity, the channel is still unable to contain the waters of great floods, lines of embankment may be raised on either side of it, with the soil removed in forming the slopes; and thus restrain them within due bounds. Likewise in particular parts, as at sharp bends, when ordinary sward, or pasturable turf, is not able to prevent the current, in this trying situation, from breaking up the soil, it should be bound more securely together by stronger rooted plants; of which the osier is said to be profitable to be planted upon the top of a rich river-bank; but it is altogether unfit to occupy its face for the purpose here required, though commonly used; as it tends to counteract one of the intentions proposed in sloping back the face of the bank; by filling up the space thereby prepared for the waters of high floods to spread in; and thus increases the current at the foot of the bank. A much more eligible and effectual guard presents itself, Mr. Marshall says, in the furze, whose roots not only form a mat of strong fibres in the soil, but bind it down to the substratum in a singular manner. Yet even the furze, if suffered to run up to its greatest height, may frustrate the intention of propagating it. It ought, therefore, to be cut down from time to time as fuel; or to be kept close mown, so as to form an invulnerable shield to the face of the slope. But it is observed that if we examine into nature's practice in guarding the soil of river-banks, we shall find it carried on with the best effect by the butter bur (*tussilago petasites*).

But in these cases of securing the banks of rivers, Dr. Anderson has long since given more full and ample directions. He remarks, that when a river runs in a bed of rich vegetable mould, the least accident that may chance to direct the stream towards any particular part of the bank, causes it to sweep away large tracts of fine ground, to the very great detriment of the proprietor, as well as the public; as this fine mould is usually carried to the sea, and the materials that the water leaves, to occupy the new bed that it thus forms for itself, is generally of a much worse quality, consisting chiefly of stones, sand, and gravel. And that where the whole force of the current is quite close to the bank, and the materials necessary for fencing it are not to be there found, it may perhaps be impossible, or very difficult, totally to prevent this evil: but, for the most part, it admits of a cure, that can be obtained at a pretty moderate expence. For if you carefully observe the banks of rivers, you will readily remark that these ravages are always most considerable at those places where the banks rise perpendicularly to a pretty considerable height above the ordinary surface of the water, and never at those places where the banks shelve down gradually towards the water's edge: for when the river is swelled to a great height by rains, and runs with a greater force and rapidity than usual, it strikes violently against these perpendicular banks that directly oppose its course; and as they are composed of earth, quite bare and uncovered, they are easily softened by the water, and quickly washed away; so that the upper part of the bank, being thus undermined, falls by its own weight into the river, and is carried off in prodigious quantities. But when the river rises to any considerable height, it generally glides along the surface of those parts of the bank which shelve gradually downwards to the water's edge, which being defended by the matted roots of the grass, with which it is covered, scarcely sustains any damage at all, and is nearly the same after the water has retired within its banks, as before the inundation took place. He thinks that these are facts, which no one, who has bestowed the least attention to this subject, can fail to have observed; and that they

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clearly point out, that the first and most necessary step towards a cure is to level down the edge of the bank that is next the water, so as to make it slope gradually down towards the river. And that where the bank is very high, and you have no other particular use for the earth that must be taken from it, the easiest method of disposing of it will be to throw it into the river. But in whatever manner you dispose of the earth, the slope of the bank must be continued until the inner edge of it is as low as the surface of the water, at the driest time of the year, and be made to ascend gradually upward from the water with an easy slope, till it comes to the level of the ground, or at least rises to such a height as the water never exceeds. And the work ought to be performed as early in the summer as possible; and the slope should be either immediately covered with turf, pared from the surface of some field that has a very strong upward upon it, taking care to lay their ends in such a manner as to be in as little danger as possible of being washed away by any accidental flood that might happen, before they are grown together; or, if turf of this kind cannot be had, it should be sown very thick with the seeds of some small mat-rooted grafs, that should be kept in readiness for that purpose, such as the creeping meadow-grafs. If the stream has not been extremely rapid at the foot of the bank, some of the earth that was thrown into the water will be allowed to subside to the bottom, and will there form a bed of loose soft earth, which will be of very great use afterward in preventing the face of the bank under water from being washed away. But in order to secure this bulwark effectually for the future, the surface of this soft earth ought to be instantly stuck full of the roots of bog-reeds, flags, water-spiderwort, rushes, and other mat-rooted aquatic plants; which, if allowed to remain till they have once struck root, will afterward form a barrier that nothing will ever be able to destroy. It is added, however, that if the stream be too rapid to admit of this, and the bank of soft earth much deeper than the surface of the water, it will be of great use to fill up the breast of the bank with small loose stones, with a little earth intermixed among them, carelessly thrown in till they rise near the surface of the water, which would most effectually secure it against any future encroachments, if the bank is sloped away above. It is further stated, that in case it should so happen that stones cannot be easily got for this purpose, the only recourse is to dig the bank so low, as that at the undermost edge it may be always below the surface of the water, and carry it out in this way for a considerable distance; and then stick the whole surface, that is below the water, full of mat-rooted aquatic plants, strewing it over, if possible, with a thin bed of small gravel or sand, as convenient, which will in a great measure, if not entirely, defend it from future encroachments. And this bank ought to continue to shelve downwards, even where it is below water; and those aquatics that will grow in the greatest depth of water be planted on the innermost bank, and the others behind them. The water-spiderwort will grow in four feet depth of water; and the roots of the common yellow-flowered water iris forms such a strong and compact covering, upon the surface of the soil on which it grows, as would defend that soil from being affected by the water almost as well as if it were a rock. It is likewise an advantage attending this plant, that it grows upon a firm bottom, and chiefly delights in running water. But where the stratum of soft earth is not so deep as to reach to the surface of the water, and lies upon a stratum of rock or hard gravel, there will be no occasion for throwing in stones of any kind. But as it is difficult to unite the vegetable mould to any of these strata,

there will always be some danger of its separating from them, in violent inundations; and if the water once gets an entry, the breach will not fail to grow larger and larger by every inundation. To prevent this inconvenience, it will be necessary, after you have sloped the earth away till you reach the gravel or rock, to cover the place where the edge of the earth joins the inferior stratum with a good many small stones, if they can be found, sowing between them the seeds of any kind of plants that you think are most likely to thrive, which have strong matted roots, with as small and flexible tops as possible. But where the object is of great importance, it will be still more effectually secured, if the face of the rock be dug entirely away for some distance backward, and the place which that rock originally occupied be then filled up with earth, and sloped back in the same manner as if it had been an earthen bank, in which no rock was to be found. In all operations of this sort, great care should be taken that no stones should be mixed with the mould; for every thing that makes an inequality on the surface, or a difference in the firmness of particular parts, is extremely pernicious. It is evident, that from the impossibility of ever making earth adhere firmly to stone of any kind, it must always be an improper practice to face the banks of a river to a certain height with stone, which is capped at top with earth; as it must always be liable to be removed. This method has been since found to answer perfectly in actual trials in such cases.

There is, the same author observes, another mischief produced by the swelling of rivers, from the water overflowing the rich flat ground, that is frequently met with on the sides of them, which sometimes prevents them from being got laboured at the proper season, sometimes sweeps off at once the whole crop, and sometimes destroys it by covering the whole surface with stones and gravel, to the unspeakable detriment of the possessors of such ground. And as these lands, sometimes termed *haughs*, are generally very rich and fertile, and sometimes of great extent, the damage that is done by not getting them properly cultivated is very considerable. In respect to the mode of removing this sort of inconvenience, it is remarked that these haughs are seldom of great extent, excepting on level tracks, where the water runs with no impetuous current; and, therefore, they may in general be preserved by means of a sloping bank, raised all along the side of the river, as far as the haugh extends, which, if formed by the same plan as those described above, will easily confine the water within their boundaries, till it rises so high as to overflow the top of the bank; so that if these are raised to a sufficient height towards the back part, in such a manner as to be capable of containing the whole of the water that at any time flows down the river, the fields on each side will be effectually secured. And that where the surface of the ground in the haugh is at any considerable height above the water in the river, the bank may perhaps be raised to the necessary height, by throwing the earth that is taken from the brink of the river to the other side of the bank, so as to form the new surface of the bank on that direction, instead of the old surface. But if the surface of the ground is level on the opposite side of the river, the earth that is taken from the triangle in the whole will not, in that case, be sufficient to fill up the whole of the other triangle, and raise the bank to a proper height; to make up which deficiency, it will be necessary to dig a ditch at the back of the bank, throwing the earth into the higher part of the bank, and facing up the line with stones or turf, so as to make it become a fence to one side of the field that it preserves from inundations. However, where the surface of the ground is extremely low, so as to be but

little above the level of the water, then, instead of raising the bank on each side to the proper height, it will be more advisable to raise them only to the height of a particular line; as, in that case, it would be very difficult to find as much earth as would form both the banks, although there will be no difficulty in forming the smaller one; and as the areas of the two are equal, these lower banks will contain an equal quantity of water within them, as the higher ones would have done; the greater width between them making up for their want of height. And it is conceived, that in this way it will be in the power of any man so to proportion his banks to the circumstances in which he finds himself placed, as in the easiest manner to accomplish his design: for if he has plenty of materials at hand, he may rear his banks to a greater height, and confine the river to a narrower course; and if he finds a deficiency in that respect, he may make them of a smaller height, and allow the river to spread to a greater breadth. It is added, in concluding this account, that this method has been found to answer very well in actual practice; but that, in some cases, it was found that while the bank was new raised, and before the surface was grown together, some parts of that surface were broke a little, when the water rose to a great height. In this case, the bank consisted entirely of loose sand, which is the worst material it could be formed of; but this was easily repaired, at a very small expence, when the water subsided. If these small breaches, however, had been neglected, there is no doubt but the whole would quickly have been destroyed. It was found that a few small stones, laid upon the surface of the sward, near the edge of the water, proved in this case a very useful addition. In cases where the sward is firm, this caution would have been unnecessary. Whoever attempts this mode of fencing, should take care to provide themselves with a sufficient quantity of the seed of the plant, usually called *sprots* in Scotland, to sow near the edges of the water; for these other kinds of grasses are shelled, and without this precaution, the surface remains bare, and is therefore liable to be washed away with the water, during the time of floods.

There are other cases in which attention is sometimes necessary to rivers, which are in those of the vale kinds, which run in very serpentine or crooked directions. In these cases it is sometimes proper to straighten them, though it is but in few instances, Mr. Marshall thinks, that this can be done with propriety and advantage, in respect to profit. And though the principles and management are the same in the execution, there is much difference from the want of suitable materials, &c.

The instances in which the courses of rivers that have their beds greatly sunk below the general level of the surface of the lands, as five or six yards, may be straightened in a profitable manner, are, it is observed, where two reaches, or straight parts, run in a line with each other; but are separated by a narrow neck of an extensive tract.

In this case nothing more is required than that the earth which is taken out of the new cut, should be thrown into the ends of the old bed, by which the stream, both at low water and in time of flood must possess a straight unimpeded course. And by this means the proprietor on this side not only obtains an acquisition of ground in the old river bed for different purposes, but on his own side of the river gains a length of straight ground for the plough or scythe. But at the time this proprietor is thus benefited, the property on the other side may be injured; as by shortening the length, and that of straightening the direction of the river, the force of its stream or current at the upper bend may be considerably increased, and the land there greatly endangered.

Hence Mr. Marshall thinks, that this obvious alteration should not be undertaken, except under the sanction of a commission of drainage, or till the proprietor below be indemnified for the injury that may be sustained. It is suggested, that in the above instance, half of the bed of the old river might be a sufficient indemnification. There is, however, a great variety of small streams and rivulets in the bottoms of steep declivities, that have such winding and serpentine courses, that they might be straightened with not only profit, but vast advantages to the lands on the different sides. In many situations it is disgraceful to see the destruction and injury that is caused by these little winding streams in the time of floods, and when they are in high water.

The proper protection and management of river-banks is unquestionably a work of great interest and importance in many instances; as they are very liable to be extensively destroyed by the streams, and much loss of valuable land to be thereby produced, as well as to be the cause of frequent disputes and litigations between neighbouring landholders. Rivers for the most part form the most tedious, troublesome, and indifferent boundaries of any betwixt landed properties.

The subject of guarding and securing their banks has hitherto been but little understood, either in theory or practice, though it obviously requires equal, if not more attention, than any other rural practice, as being very serious in its consequences, both as to the mischiefs, and the ineffectual, though expensive, modes of preventing them. The practical directions that have been given above should therefore be well considered, as they may save much labour and expence, when well applied; as well as prevent a variety of disputes, and the frequent loss of much useful land. Plans of the methods of accomplishing the work in different cases, may be seen in the second volume of the Farmer's Dictionary.

Before undertakings of this nature are begun, proper plans and estimates of expence and profits should constantly, as has been seen, be prepared, and contracts, where possible, entered into for their execution with persons of experience, always binding them to uphold the works for a certain number of years afterwards; as by these means much money, timber, labour, and unnecessary trouble, will be saved, which would otherwise be thrown away, and the works be improperly managed. Besides, the means will be properly proportioned to the ends which are designed, in all cases. The interest of opposite proprietors will likewise often be shewn to be one and the same, which will greatly promote such works in different instances. See EMBANKMENT.

RIVER *Guards*, terms applied to such piers, mounds, or other solid embankments, as are carried out for the purpose of altering, directing, or confining, the courses of rivers. They are distinguished into common, and what are termed *dwarf* guards; the former being those employed for large rivers, and the latter, such as are made use of where the force of the currents are less violent and less heavy.

With regard to the substances that are most commonly made use of in this intention, they are all sorts of hard weighty materials, such as rough coarse stones of different kinds, large pebbles, heavy pieces of timber secured by piles firmly driven into the ground, and supported behind by coarse gravel stones, or other similar materials, the roots of trees with the earth about them, posts firmly driven in with planks nailed to them, and well banked with strong substances, piles driven in and wattled with fods, being well banked with the same substances. Besides these, various other materials are presented to the attention of the work-

men in different situations and circumstances where these forts of guards are wanting.

RIVER Guide, a strong work of the pier kind, carried out on them for the purpose of disposing their streams to take more suitable directions or courses for preventing their mischievous effects on the banks or lands on their sides. See **RIVER-Banks**, *Securing*.

RIVER Weeds, in *Farming*, are such sorts of plants as grow on the sides, and other parts, of rivers. When collected in large quantities, they are highly valuable for the purpose of manure. And in compost with other substances they have been found of much utility in the practice of several writers in the *Transactions of the Bath society*. And Mr. Crowe, of Lakenham, in Norfolk, according to Mr. Young's agricultural survey of that district, manures four acres annually for turnips, with the weeds of a river that runs by his farm; the plants are chiefly the philandrium aquaticum, and sium nodiflorum, the water hemlock and water parsnip. It is stated that he lays twenty loads of thirty bushels *per acre*, and ploughs in directly; which are as good on sand and mixed loam as the best dung; but not equal on stiff soils; and it is added, that Mr. Bloomfield, of Billingsfold, has been in the habit of manuring his turnip lands with weeds fresh from the river, and ploughed in quickly; they have answered as well as yard muck.

But where these sorts of materials are made use of for the purpose of manure, the plants should be removed while in their most succulent green state, and be turned into the soil as quickly as possible afterwards. In the making of them up into composts, a great loss is probably sustained in the ex-
trication and dissipation of the more fluid parts. And it is obvious, that as manure they must be the most useful when applied to the light friable descriptions of soils, as in these they run more rapidly into a state of putrefaction. It is probable they cannot be used with advantage on the stiff heavy soils in their green state. See **MANURE** and **WEEDS**.

RIVER, *Fordable*, in *Military Language*, a river which may be passed without the assistance of any floating machines. In order to sound the ford, and to ascertain the state of it, men on horseback are first ordered to cross. By that means you will be able to know whether any obstacles have been thrown in the way by the enemy; for nothing is more easily effected. The passage of a ford may be rendered impracticable by throwing whole trees in, by tables or platforms covered with nails, and by stakes. The two latter impediments are the most dangerous. But stakes are not easily fixed, and are consequently seldom used. When fords are embarrassed by them, it requires some time and trouble to clear the river; and it is equally difficult to get rid of the inconvenience that arises when wells have been sunk. Whenever there is reason to apprehend such obstacles, it is always best to reach the ford at dusk.

When the prince of Condé, in 1567, resolved to cross the river Seine, the Royalists, who were on the opposite side, endeavoured to prevent his passage by throwing quantities of madders or thick planks that were nailed together, iron hoops and water-cats into the ford. The Huguenots or Protestants, however, were not diverted from their purpose. Aubigné, a French writer, says, that on that occasion they placed 400 arquebusers upon the bank to protect the men that raked the ford.

This was certainly a singular method which was used to clear a ford, nor could it be done without much difficulty, and no inconsiderable share of danger. The chevalier Follard has proposed a much safer, and a much easier way, by means of grappling hooks, tied to long ropes, which might

be thrown into the ford. Yet even in this case, observes the writer, the object could not be accomplished if the river were broad, unless the persons employed in the undertaking be under the cover of so heavy a discharge of ordnance and musquetry, that the enemy would not be able to interrupt them, even from an intrenched position on the opposite bank.

With respect to caltrops, the removal of them, when properly distributed at the bottom of a ford, must be attended with great difficulty; for they must render the passage absolutely impracticable, unless they were to sink very deep into the mud and sand, and thus become useless. The men that first enter are in this case the only persons incommoded, but the rest may follow without much hazard.

It sometimes happens, that the bottom of a stream or rivulet is firm and gravelly; when this occurs, the greatest precautions must be taken to escape the effects of caltrops, which would be extremely hurtful to any persons that might attempt to cross. In order to obviate their mischievous consequences, and to render them in a manner useless, a good stock of hurdles must be provided. The soldiers will hand these to one another, force them into the water, and then cover them with stones.

When one or two fords in a river are so situated, that several battalions cannot cross them upon one front, it is then highly prudent to throw a bridge over, either above or below the ford; for a swell may intervene and render it otherwise impassable; add to which, you have the advantage of getting a greater number of troops over at once.

In order to effect a passage for his army over the river Segre, Cæsar gave directions that ditches, thirty feet broad, should be dug in such parts of the banks as might, with ease, receive the water out of the stream, and render it fordable. Having accomplished this object, he found no difficulty in reaching Petréius, who, being in the daily fear of wanting provisions and forage for his men, was on the eve of quitting his position and marching forwards.

The passage of the Granicus by Alexander the Great, is likewise mentioned in history, as an instance of bold enterprise. But however celebrated that act may be in ancient records, we shall not be thought partial to the moderns when we state, that the passage of the river Holowitz by Ch. XII. of Sweden, was equally bold and well managed.

The passage of the Teglimenti by Bonaparte during his campaign in Italy, is the most celebrated of the present day.

RIVER Bay, in *Geography*, a bay on the N.E. coast of Barbadoes; two miles N.W. of Cuckold's Point.

RIVER'S Canal, an inlet on the N.W. coast of North America, discovered by Capt. Vancouver in the year 1792. This canal extends from S. to N. about 16 miles, and terminates in N. lat. 51° 42'. E. long. 232° 22'.

RIVER of the West, a river of North America, which runs into the Pacific ocean, N. lat. 43° 18'. W. long. 122° 30'.

RIVER Horse, in *Zoology*. See **HIPPOTAMUS**.

RIVER Navigations, in *Hydrology*, denote those which are wholly or in a great part restricted to the ancient channel or bed of a river. See **CANAL**.

RIVER, *New*. See **CANAL** and **COMPANY**.

RIVERHEAD, in *Geography*, a township of New York, in Suffolk county, Long island; it was taken from the township of Southold, incorporated in 1792, and contains 1501 inhabitants.

RIVERIUS, **LAZARUS**, in *Biography*, a distinguished physician of the 17th century, was born at Montpellier in the year 1589. He studied in his native university, but was very slow in his attainments, insomuch that he failed in his first

first examinations for his degree. This failure, however, occasioned him to redouble his exertions, and he gave sufficient proofs of his acquirements in the following spring, 1611, when he was admitted to the degree of doctor. His attachment to study became very great; and in 1622 he was appointed to the professorship of medicine in the university, an office which he continued to fill with great honour during the remainder of his life. He died in the year 1655. Riverius published "The Institutes of Medicine," in five books, in Latin, of which there are many editions, and which must be deemed a very respectable work for the time. But his principal work, and that which has gained him considerable reputation, is a course of medicine, entitled "Praxis Medica." The first publication of this work consisted of a mere practical treatise, without any pathological discussion, as a sort of text-book, used in his lectures. But finding that many editions of it were printed in France and Holland, he enlarged and improved it, and it was printed in this state at Paris in 1640, and a great number of editions have subsequently appeared, as well as translations into French and English. It treats of most of the diseases to which the body is subject, in seventeen books, in a clear style; but in many places he appears to have borrowed copiously from Sennertus. He published also a work, entitled "Observationes Medicæ et Curationes insignes," which has been frequently reprinted, and is not now without its value. These works have been collected, and published together, under the title of "Opera Medica Univerſa." Eloy observes, that a friar, Bernardin Christin, who had been a pupil of Riverius, compiled some secrets of chemistry, which he published with the name of Riverius; and although it has been clearly proved that he was not the author of these papers, yet they have been frequently printed, in the collections of his works, and separately, under the title of "Arcana Riverii." Eloy Dict. Hist. de la Med.

RIVERS, CAPE, in *Geography*, the N.W. point of the island of Celebes. N. lat. $1^{\circ} 25'$. E. long. $120^{\circ} 30'$.

RIVES, a town of France, in the department of the Isère, and chief place of a canton, in the district of St. Marcellin; 14 miles N.W. of Grenoble. The place contains 1530, and the canton 12,019 inhabitants, on a territory of 115 kilometres, in 12 communes.

RIVESALTES, a town of France, in the department of the Eastern Pyrenées, and chief place of a canton, in the district of Perpignan; six miles N.N.W. of Perpignan. The place contains 1986, and the canton 10,036 inhabitants, on a territory of $422\frac{1}{2}$ kilometres, in 14 communes.

RIVET DE LA GRANGE, ANTHONY, in *Biography*, a French Benedictine monk, was born at Confolens, a small town belonging to the diocese of Poitiers, in the year 1683. Afterwards he was sent to study philosophy under the Jacobins, or Dominican monks at Poitiers, where he gave the greatest satisfaction by his application and proficiency. At the age of 21, he became a novice in the abbey of Marmoutier, and took the vows in the year 1705. After completing his courses of philosophy and divinity, he was transferred to the abbey of St. Florence, at Saumur, where his order was establishing a kind of academy, consisting of such members as were most distinguished by their talents and literature, for the purpose of studying the scriptures in their original languages, the councils, the fathers, and the historians of the church, without being shackled by the trammels of the schools. He undertook to write "A Literary History of France," the plan of which he had already conceived. However, before he became wholly occupied on this work, he gave to the public, through the medium

of the Dutch press, another favourite production, entitled "The Necrology of Port-Royal in the Fields, &c. containing historical Eulogies; with the Epitaphs of the Founders and Benefactors of that Monastery, &c." 1723, 4to., preceded by an historical preface. In the year 1733 he published the first volume of his work under the title of "The Literary History of France; treating of the Origin and Progress, of the Decline and the Revival, of Learning among the Gauls and among the French; of their respective Taste and Genius for Literature in each Age; of their ancient Schools, and the Establishment of Universities in France; of the principal Colleges; of the Academies of Sciences and Belles-Lettres, &c." in 4to. This was followed, at different periods, by other volumes, till the author had printed the ninth, which includes the first years of the twelfth century, when he died, towards the beginning of 1749, in the 66th year of his age. This work was afterwards extended to twelve volumes. It has been compared, and not undeservedly, with the "Memoirs" of the learned Tillemont, for accuracy of citation, and depth of research, and it will be found to furnish the reader with much interesting matter, not only on the subjects mentioned in the title, but also relating to the lives of the learned men who flourished in the ages of which it treats.

RIVET, in the *Manege*, is the extremity of the nail that rests or leans upon the horn when you shoe a horse.

RIVETS, in *Agriculture*, a term sometimes applied to a sort of bearded wheat. See WHEAT.

In Essex, throughout all the district of the Roodings, this sort of wheat is found very general, and to yield much better crops on these heavy lands, than any common sort; but on the more light soils the Kentish red is superior.

RIVIERA, or PALESE, in *Geography*, a town of Italy; five miles N. of Bellinzona.

RIVIERA di Levante, a name given to that part of Genoa which extends from the city of Genoa, included in it, to Etruria.

RIVIERA di Ponente, that part of the Genoese territory which extends westward from the city of Genoa to France.

RIVIERA, La, a town of France, in the department of the Doubs; 10 miles S. of Ornans.

RIVIERE, GRANDE. See GRAND River.

RIVIERE Pelote, a town on the S. coast of the island of Martinico.

RIVIERE Salée, a town on the S. coast of the island of Martinico.

RIVIERE Mabaut, La, a town of the island of Guadaloupe, situated in a bay to which it gives name. N. lat. $16^{\circ} 27'$. W. long. $61^{\circ} 46'$.

RIVIERE de Theyrargues, a town of France, in the department of the Gard; 14 miles N.N.W. of Uzès.

RIVIERE de Thibouville, a town of France, in the department of the Eure, 18 miles N.W. of Eure.

RIVINA, in *Botany*, was so named by Plumier, in honour of the great German systematic botanist; see RIVINUS. Linnæus at first called the genus *Rivinia*, which would have been more correct, but he did not persist in the amendment, nor has it prevailed.—Linn. Gen. 63. Schreb. 87. Willd. Sp. Pl. v. 1. 694. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 273. Juss. 84. Plum. Gen. 47. t. 39. Lamarck Illustr. t. 81. Gærtn. t. 77.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juss. See PIERCEA.

Gen. Ch. *Cal.* Perianth inferior, coloured, permanent; of four obovate, obtuse leaves. *Cor.* none, except the calyx be so called. *Stam.* Filaments four or eight, shorter than the calyx, approaching each other in pairs, permanent;

ment; anthers small. *Pist.* Germen superior, large, roundish; style very short: stigma simple, obtuse. *Peric.* Berry globose, standing on the reflexed calyx, (which is hardened and become green,) of one cell, and crowned with a little incurved point. *Seed* solitary, roundish, lenticular, rough.

Eff. Ch. Calyx coloured, in four deep segments, permanent. Corolla none. Berry with one lenticular seed.

Obs. The error of Linnæus in subsequently terming *corolla*, what he had, with indubitable propriety, called *calyx*, is difficult to be accounted for. He is followed by Willdenow, who has misled Dryander and Aiton. The natural order of the plant, as settled by Linnæus himself, determines the question without appeal.

1. *R. humilis*. Downy Rivina, Linn. Sp. Pl. 177. Willd. n. 1. Ait. n. 1. (*Amaranthus baccifer*, circææ foliis; Comm. Hort. v. 1. 127. t. 66.)—Stamens four. Leaves downy.—Native of the West Indies. Common in our stoves for above a century past, flowering at most parts of the year, and always decorated with drooping clusters of little berries, of a peculiarly bright scarlet, which make the chief beauty of the plant. The *stem* is bushy, shrubby, three or four feet high. *Leaves* alternate, stalked, ovate, acute, entire, thin, flaccid, light green, downy, about three inches long. *Clusters* from the forks of the branches, solitary, downy, of many small, greenish-white, drooping flowers.

2. *R. lævis*. Smooth Rivina. Linn. Mant. 41. Willd. n. 2. Ait. n. 2.—Stamens four. Leaves ovate, pointed, even, smooth. Stem round.—Native of the West Indies. Flowers in the stove, most part of the year. Cultivated by Miller in 1733. *Aiton*. Like the foregoing, but smooth. Margins of the *leaves* purplish. *Flowers* reddish at the outside.

3. *R. brasiliensis*. Wave-leaved Rivina. NoCCA in *Usteri Annal. fasc. 6. 63.* Willd. n. 3. Ait. n. 3.—“Stamens four. Leaves ovate, undulated and rugged. Stem furrowed.”—Native of Brazil. Introduced at Kew by sir Joseph Banks, in 1790. It blossoms in the stove in June and July. *Stem* shrubby. *Leaves* ovate, or heart-shaped, wavy, smooth. *Flowers* white or reddish. *Berry* round, of a shining red.

4. *R. octandra*. Climbing Rivina. Linn. Sp. Pl. 177. Willd. n. 4. Ait. n. 4. (*R. dodecandra*; Jacq. *Obs. fasc. 1. 6. t. 2.* *R. fermentosa*, &c.; Brown Jam. 149. t. 23. f. 2.)—Stamens eight or twelve. Leaves elliptic-oblong, smooth.—Native of the West Indies. Cultivated by Miller, before 1752. It flowers in the stove in May and June. *Aiton*. The *stem* is described by Jacquin as very tall, though slender, throwing out long slender shoots, amongst other shrubs and bushes. *Leaves* entire, acute at each end. *Calyx* white, turning to a purplish-red. *Berry* dark purple, the size of a pea, eagerly devoured by birds. *Jacquin*.

R. paniculata, Linn. *Syst. Nat. ed. 10. v. 2. 899*, though retained as such by Murray, in *Syst. Veg. ed. 14. 165*, is no other than *Salvadora persica*, as cited in Linn. Sp. Pl. 178. This being removed from *Rivina*, the character of “simple clusters” for the remaining species, being common to all, becomes superfluous.

RIVINA, in *Gardening*, contains plants of the shrubby evergreen kind, of which the species cultivated are; the downy rivina (*R. humilis*); the smooth rivina (*R. lævis*); and the climbing rivina (*R. octandra*).

Method of Culture.—All these plants may be increased by seeds procured from the places where they are natives, sowing them, as soon as they are obtained, in pots filled with fresh light earth, plunging them in a hot-bed when in summer, but in the tan-bed of the stove, in the autumn or winter. The earth should be well moistened during the

summer season, but very sparingly in the winter. They should be carefully preserved in these situations till the seeds vegetate, which is often a great length of time, of course the pots should not be disturbed. When the plants have attained about two inches in growth, they may be removed into separate small pots, filled with light loamy mould, plunging them into a hot-bed, shading them till fresh rooted.

They afterwards require the management of other stove exotic plants.

They may likewise sometimes be raised by layers and cuttings, assisted by the heat of the bark hot-bed.

After these plants have been preserved in the stove of the hot-house till they have attained a good growth and strength, they are capable of being preserved in moderate warmth in winter, and in the warmest part of summer in the open air, in a warm sheltered place.

They afford variety among other potted evergreen stove plants.

RIVINI FORAMEN, in *Anatomy*, a supposed opening in the membrana tympani of the ear. See EAR.

RIVINUS, AUGUSTUS QUIRINUS, in *Biography*, an eminent physician, but much better known as a botanist, formed, with Ray and Tournefort, the triumvirate of systematical teachers, who, in the latter part of the 17th century, and the beginning of the 18th, divided the homage of the students of botany between them. Their importance arose from the necessity, which nobody could overlook, of a methodical arrangement of plants; but even the memory of their labours has now almost passed away, because those labours proved, all nearly alike, insufficient for the desired purpose. The services they have rendered to practical science still indeed remain; and the laurels which spring from that soil are unfading. Of these Rivinus may claim a share, though by no means an equal portion, with his English, or his French, contemporary. He endeavoured in vain to bring his German squadrons, with any great force, into the botanical field; while the pupils of Ray, as well as of Tournefort, poured forth in abundance; and by their own proficiency displayed the merits of their respective leaders.

Rivinus was the son of a learned physician and critic, Andrew Bachmann, whose name, according to the fashion of the time amongst literary people, being translated into Latin, became *Rivinus*. The subject of our memoir was born at Leipzig in 1652. He graduated at the age of twenty-four, and fifteen years afterwards obtained the professorships of Physiology and of Botany in his native university. He became a foreign member of the Royal Society of London, and was associated with many other learned bodies, filling his different appointments with honour to himself, till his death in 1723, at the age of seventy-one. His publications shew him in the light of an elegant scholar and a gentleman; and if he betrayed a little impatience in his controversies with Ray, and somewhat of disdainful severity towards Dillenius, who, when a young man, had attacked him; the latter fault, at least, may be pardoned, in one who had attained to considerable a rank in science, and who perhaps had sagacity enough to feel that Dillenius had no systematical talents at all commensurate with his own. Having proposed to himself three great objects; a commodious classification of plants; a compendious nomenclature; and an universal delineation of species, as far as they came under his own observation, he might perhaps not be very patient of contradiction from those whom he thought more able to hinder than to assist him. The same apology may be made for many philosophers, who unjustly incur the charge of petulance, or of pride.

The botanical system of Rivinus is founded on the most elegant and attractive, if not the most solid and important, parts of plants. His classes are marked by the number, the regularity, or irregularity, of the petals. He could not proceed far in this path without perceiving that he made most unnatural, and, as Haller justly terms them, paradoxical, combinations. He therefore asserted, and doubtless believed, the inutility and impracticability of a really natural classification. This principle brought him to one right conclusion, which even the philosophical Ray did not attain, or was afraid to admit, that the old primary distribution of vegetables into trees, shrubs, and herbs, is unscientific and erroneous.

Rivinus published, at his own expence, in 1690, his splendid illustration of the first class of his system, comprising such plants as have a monopetalous irregular flower. These are the ringent flowers of Linnæus, accompanied by the *Scitamineæ*, and even by *Arum*. This part consists of one hundred and twenty-five plates; but though each plate often contains more than one plant, the intelligent reader will perceive how imperfect the catalogue of species must be. A learned *Introductio generalis in rem herbariam* is prefixed; and this introductory part was, at different times, republished in a smaller form. The second part of the sumptuous work of which we are speaking, came forth in 1691. This consists of one hundred and twenty-one plates, of plants with four irregular petals; into which class, by means of some contrivance, and many grains of allowance, are admitted all the papilionaceous tribe, the cruciform genus *Iberis*, the *Euphorbia*, and a few things besides. The genus last named is referred rather arbitrarily to this class, merely because its stalked pendulous germs must be turned to one side, and therefore, in the author's opinion, the flower is rendered irregular. In 1699 the third part, containing flowers with five irregular petals, was given to the world. Even more liberty is taken in the assemblage of genera here than in the former class. The natural order of *umbellifera* is admitted entire; very justly indeed as to practical or philosophical propriety; but with great laxity of artificial principle, many of the plants having regular or equal petals. Next to these follow *Tropæolum*; the irregular *Gerania* (which now constitute the genera of *Pelargonium* and *Erodium*); some leguminous plants not papilionaceous; *Viola*; *Aesculus*; *Delphinium*; *Aconitum*; *Disianthus*; and the whole concludes with *Pyrola*, whose slight and partial irregularity of flower has gained it admittance here. This third part of the work of Rivinus consists of one hundred and thirty-nine plates. A fourth part, the *hexapetala irregulares*, consisting of the *Orchideæ*, was finished, but not published, before the author's death; nor indeed have any more than a very few copies of this ever got abroad into the world, so that it constitutes one of the greatest bibliothecal rarities. With respect to utility or beauty, those who are possessed of the transcendent engravings of this favourite tribe in Haller's History of Swiss Plants, may dispense with the figures of Rivinus. The author had prepared several supplementary plates to his work, which never came forth, and of which perhaps the only specimens are to be seen in sir Joseph Banks's fine copy of the whole work, except two duplicate plates bestowed by his bounty on the writer of this article. There is every reason to believe that the copy in question belonged to the author himself, or to his son, as may be gathered from its manuscript additions and corrections. A complete copy, of even the three first parts of Rivinus's book is, indeed, difficult to be met with; for several of the plates having from time to time received additions of seed-vessels, or of entire plants; the earlier im-

pressions of such plates are consequently imperfect. The best copies are required, by fastidious collectors, to have every plate with and without the additions. Haller truly remarks, that the author evidently derived his materials chiefly from garden plants, and having system in view, was more solicitous to exhibit flowers than roots, or the lower part of the herbage; a great defect as to the *Orchideæ* and *Umbellatæ*. We ought, at the same time, to recollect, that the tribes he has selected are among the most interesting, attractive, or difficult, that could have been wished. His scheme of nomenclature deserves high commendation as such, though it proves totally inadequate to the author's purpose, which was to comprehend, in a single word accompanying the generic name, the essential character or idea of each particular species.

As a medical writer, Rivinus has the merit of faithful observation and description, in his treatise *de Peste Lipsiensis*, published in 1680. He wrote also on Dyspepsia, on Intermittent Fevers, and various other subjects. He did not scruple to attack whatever practice or opinion he found ever so strongly established on the basis of prejudice and ignorance. In this respect his *Censura Medicamentorum officinalium* ranks very high. His commendable aim, in this work, was to clear the *Materia Medica* of its various disgraceful incumbrances; so many of which originated in error, imposition, or superstition. His attempts have been followed up by various men of ability and authority; and it is to the united labour and good sense of such, that the world is indebted for the purified and improved state of our modern Pharmacopæias.

Though not a great practical anatomist, or dissector, Rivinus is said to have discovered a new salivary duct. He left a son, John Augustus Rivinus, who succeeded him as professor, and under whose presidency was published a dissertation, in 1723, on Medicinal Earths. This gentleman died in 1725, aged thirty-three, having survived his father but two years. His premature death seems to have prevented the publication of the fourth part of his father's great botanical work, at least for some time. Haller says, Ludwig afterwards edited the plates of the *Orchideæ*, without any letter press; but this publication has never come under our inspection. Rivini Opera. Hall. Bibl. Bot. Aikin's Gen. Biogr. Dryand. Bibl. Banks.

RIVISONDOLI, in *Geography*, a town of Naples, in Abruzzo Citra; 9 miles S.E. of Sulmona.

RIULI, a town of Naples, in Calabria Citra; 16 miles N.N.E. of Cassano.

RIVOGLIOMENTO, Ital. in *Music*, changing the place of the parts of a composition. It is placing the treble or other upper part in the tenor or base, and *vice versa*. This frequently happens in double counterpoint, when the treble serves for the base, or the base for the treble; and in such a manner, as that the harmony, though different, shall remain equally correct and pleasing as in the first arrangement of the parts.

RIVOLGIMENTO, Ital. inversion.

RIVOLI, in *Geography*, a town of France, in the department of the Po, situated at the declivity of a hill on the road from France into Italy by the Cottian Alps, in a fertile country and climate more salubrious, as it is said, than that of Turin. It contains three parish churches and three monasteries. The king of Sardinia had a palace here. The inhabitants are supposed to be about 800; 6 miles W. of Turin.—Alfo, a town of Italy, in the Veronese; 12 miles N.W. of Verona.

RIVOLTA, a town of Italy, in the department of the Mincio; 4 miles W. of Mantua.—Alfo, a town

of Italy, in the department of the Adda; 2 miles S. of Crema.

RIVOLTA Secca, a town of Italy, in the department of the Adda; 10 miles W. of Crema.

RIVOLTARE, Ital. in *Musci*, to reverse; whence

RIVOLTATO, reversed. See **ROVERSCIO**.

RIVOLTELLA, in *Geography*, a town of Italy; 17

miles E. of Brescia.

RIUT, a Russian settlement on the W. coast of America.

N. lat. 65° 25'. E. long. 209° 36'.

RIVULARIA, in *Botany*, so called by Dr. Roth from its growing generally in rivulets, is a cryptogamic genus, separated, by that able botanist, from *Ulva* and *Conferva*: to each of which genera some or other of its species had been, by preceding writers, referred.—Roth Catal. v. 1. 212. Sims and König's Ann. of Bot. v. 1. 247. Smith Engl. Bot. v. 25. 1797.—Class and order, *Cryptogamia Algæ*. Nat. Ord. *Algæ submersæ*.

Ess. Ch. Frond gelatinous, firm, destitute of an external cuticle. Fructification among jointed filaments, lodged in the substance of the frond.

Roth describes eleven species of this genus, in his *Beyträge*, v. 1. 239, translated in Ann. of Bot. above cited. He there also adopts a genus from Micheli, by the name of *Linckia*, whose character is as follows. Frond gelatinous, pellucid, enclosed in a membranous pellucid integument, and stuffed with granules of fructification, disposed in curved beaded lines. Of this he defines four species.

Of his *Rivularia*; *elegans*, n. 5, Engl. Bot. t. 1797, and *tuberculosa*, n. 11, Engl. Bot. t. 2366, are acknowledged natives of Britain; as are two of his *Linckia*; *pruniformis*, n. 2, which is *Ulva pruniformis* of Linnæus, and of Engl. Bot. t. 968; and *Nostoc*, n. 3, which is *Tremella Nostoc* of Linnæus, and of Engl. Bot. t. 461. The *pruniformis* just mentioned, is in the index to Engl. Bot. referred to *Rivularia*; how justly we dare not positively say. In the same work the following species are added to those of Roth. Respecting the marine ones, there may possibly be some difference of opinion as to their genus; but they can scarcely be referred to any other at present established.

R. Opuntia. Indian-fig Rivularia. Engl. Bot. t. 1868. (*Fucus Opuntia*; Gooden. and Woodw. Tr. of Linn. Soc. v. 3. 219. *Tremella marina cæspitosa, fermentis tenuibus*; Dill. Musc. 50. t. 10. f. 9.)—Compressed, branched, red, jointed; joints elliptical, confluent. Internal filaments repeatedly forked; their ultimate joints shortened, filled with seeds.—Found on rocks, on the British coast, forming small, creeping, purplish tufts, between high and low-water marks. The fronds are entangled, much branched, compressed, of a spongy texture, but not hollow, composed of elliptical joints. These, when cut transversely, prove full of innumerable forked, beaded filaments, whose joints, near the surface of the frond, are shortest, and full of red grains, presumed to be seeds. We do not pretend that this species answers well to the character of a *Rivularia*. It will probably hereafter constitute a new genus, along with several more, now dispersed in *Fucus*, *Conferva* or *Ulva*, but whose fructification and economy are not sufficiently known, for any decisive measure to be taken concerning them. Among them perhaps is *Fucus Wigghii*, Engl. Bot. t. 1165; for we are not yet persuaded of its being a real *Rivularia*; nor have we examined it minutely ourselves.

R. vermiculata. Worm-shaped Rivularia. Engl. Bot. t. 1818.—Cylindrical, much branched, brown; branches scattered, subdivided, crooked. Internal filaments compound and divaricated; their ultimate branches clustered, beaded, thickened upwards. Fruit obovate, sessile at the

base of the beaded branches.—Found on the coasts of Ireland and the south of England, in summer. A very curious submarine plant, four or five inches high, olive brown, much and irregularly branched, solid, gelatinous, invested with a pale slimy mafs, of minute, jointed, branched fibres, some of which are darker, and beaded, and accompanied by a dark, oval, solitary seed at their base.

R. verticillata. Whorled Pink Rivularia. Engl. Bot. t. 2466. (*Ulva verticillata*; With. v. 4. 127.)—Cylindrical, much branched, very gelatinous, pale pink; branches alternate; the ultimate ones very numerous, of equal thickness. Internal filaments whorled, repeatedly forked. Fruit obovate, lateral.—Found on the sea beach of Ireland and Sussex, in summer. Highly gelatinous and tender, of a delicate flesh-colour. Its generic characters nearly accord with the last.

R. incrassata. Thick Green Rivularia. (*Ulva incrassata*; Hudf. 572. Engl. Bot. t. 967. *Tremella palustris gelatinosa, damæ cornuum facie*; Dill. Musc. 51. t. 10. f. 10.)—Compressed, much branched, gelatinous, sinuated and toothed, green; thickened at the margin. External filaments loosely tufted, forked, with pale pellucid tips.—Grows on mosses, in pools of fresh water. Whole plant gelatinous and slippery, of a grass green. It seems very near *R. Cornu damæ* of Roth, if not the same.

R. tuberiformis. Potatoe Rivularia. Engl. Bot. t. 1956.—Irregularly globose, inflated, pale brown; white within. Seeds vertically disposed in rows at the summits of the filaments.—Grows on rocks and submarine plants, on the south coast of England. When floating it looks like a group of young potatoes. Each plant is hollow, consisting of a thick tender coat. The outside is not, as in the last, covered with pellucid filaments, beyond the seed-bearing part.

R. atra. Small Black Rivularia. Roth Catal. v. 3. 340. Engl. Bot. t. 1798.—Hemispherical, solitary, sessile, hard, black. Internal filaments straight, compact, branched, concentric, green; their joints cylindrical.—This is found on mud, or on wooden piles, in salt marshes, or about the mouths of rivers; consisting of black granules the size of mustard-seed. These, when highly magnified, and cut perpendicularly, are found to consist of concentric rows, of more or less pale, green, dense filaments.

R. calcarea. Calcareous Rivularia. Engl. Bot. t. 1799.—Hemispherical, sessile, clustered, hard, green. Internal filaments straight, compact, entangled, simple, with scarcely any appearance of joints.—This is found in the beds of rivers, and mountain torrents, in Ireland, Wales, &c. in masses, either separate, the size of a large pea, or aggregate and confluent. Their colour a glaucous green; their substance firm, of simple parallel fibres, or tubes, all conglutinated, as it were, with calcareous earth.

R. echinulata. Little Hedgehog Rivularia. (*Conferva echinulata*; Engl. Bot. t. 1378.)—Floating, glaucous, globose, muricated with the points of its concentric, simple, jointed, short filaments.—Found by the Rev. H. Davies, in a lake, in Anglesea, covering the surface in June and July, with a floating mafs of little separate prickly globules, each the size of a pin's head.

RIVULET, a diminutive of river.

RIXAS, in *Geography*, a mine-town of Brazil, in the government of Goyas; 80 miles N. of Villa Boa.

RIXDOLLAR, in *Commerce*, a money of account and silver coin in Holland, Germany, Denmark, and Sweden. In Holland, a rixdollar is worth 2½ gilders, 50 stivers, or 800 pennings. A pound Flemish is equal to 6 gilders, or 2½ rixdollars, and is divided into 20 shillings, 120 stivers, or 240 pence Flemish, called also groots: hence a rixdollar is

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equal to 8s. 4d. Flemish, and a gilder = 3s. 4d. Flemish. A gold gilder, with which accounts are kept in the corn trade, is worth 28 silvers. At Copenhagen accounts are kept in ryksdalers or rixdollars of 6 marks, or 96 shillings Danish. In the duchies of Holstein and Sleswig accounts are kept in rixdollars of 3 marks, or 48 shillings Lubs, and at Elsinour on the Sound, accounts are kept in rixdollars of 4 orts, or 96 skillings Danish. The base rixdollar (sletdaler), which is an imaginary coin, is reckoned at 4 marks, or 64 skillings Danish. A mark is divided into 16 skillings or shillings; and a skilling into 2 fyrkes, 3 wittens, or 12 pfenings Danish. The Danish denominations of marks and shillings bear only half the value of the same denominations in Lubs or Hamburg money: thus, 2 marks Danish are worth 1 mark Hamburg, &c. In silver, specie rixdollars, which pass for 7 marks 6 skillings Danish currency, are commonly reckoned at 6 marks 12 skillings crown money, at the toll on the Sound. There is also the new Holstein currency, coined since the year 1788, consisting of specie rixdollars, at 48 shillings specie, or 60 shillings Holstein currency; and pieces of 32, 16, 8, 4 and 2 shillings specie, or 40, 20, 10, 5 and 2½ shillings Holstein currency. In this money, the Cologne mark of fine silver is coined into 9¼ rixdollars specie, or 11⅞ rixdollars currency.

Any person, whether a native or a foreigner, may open an account at the bank of Copenhagen, on paying 4 rixdollars a year for each folio, and whenever he wishes to have his account settled. Besides, this bank charges a commission of 1 per 1000 for all the money inscribed or transferred in the books. Bank notes are issued of the value of 80, 40, 20, 8, and 4 rixdollars specie; or 100, 50, 25, 10, and 5 rixdollars currency. These are current through the Danish dominions, and they are to be paid off on demand at the bank.

By a royal edict of 1776, settling the rate of coinage, 9½ rixdollars specie are to contain a mark of fine silver; each piece weighing 537.69 eschen, Cologne weight, or 447.9 English grains, and being 14 lods or ¼ths fine; so that it contains 391.9 English grains of fine silver. The rixdollar Danish currency, in current ducats or 12 markpieces, is equivalent to 28.48 German ascs, or 21½ English grains of fine gold; and the same rixdollar, in silver currency, contains 429 ascs, or 318 grains of fine silver. The rixdollar in crowns may be valued at 467 ascs, or 346½ grains of fine silver. Thus the proportion of gold to silver is as 15⅞ to 1. One hundred rixdollars Hamburg banco answer to 113½ rixdollars in crowns, or 123⅞ rixdollars Danish currency: the latter may be considered at par with Hamburg currency. The rixdollar currency is = 3s. 8½d. sterling; and the rixdollar in crowns = 4s. 0½d. sterling; or a single crown piece = 16d. sterling; a current ducat = 7s. 5½d. sterling; and 1l. sterling = 5 rixdollars 2 marks 6 skillings currency, or 4 rixdollars 5 marks 12 skillings crown money.

The most common way of keeping accounts in Germany is in rixdollars of 90 creutzers, or in guildens or florins of 60 creutzers; the rixdollar of account, or (as it is generally called) rixdollar current, is reckoned at 1½ florin, and the rixdollar specie or effective at 2 florins, or 120 creutzers. In Prussia, Saxony, Hanover, Brunswick, and Lunenburg, accounts are kept in rixdollars of 24 good groschen, each good grosche being divided into 12 pfenings; or in rixdollars of 36 marien groschen, each marien grosche being divided into 8 pfenings. At Hamburg, Altona, Lubbeck, Holstein, and Mecklenburg, accounts are kept in marks of 16 shillings lubs, each shilling being divided into 12 pfenings; and the rixdollar reckoned at 3 marks. Each independent state or city of Germany has its own coins, most of which

may be referred to, or compared with, the following, viz.; in gold, the ducat, the pistole, and the gold florin or gulden; and in silver, the rixdollar specie, and its subdivisions. The pistoles are all reckoned at 5 rixdollars current. The gold florins, chiefly current in countries on the banks of the Rhine, pass generally for 2 rixdollars current, and are to contain 18½ carats of fine gold, 3½ carats of fine silver, and 1½ carat of copper: 72 gold florins are to weigh a Cologne mark. Since the establishment of the convention in 1763, the Cologne mark of fine silver is valued at 13½ rixdollars of account, or 10 rixdollars effective, or 20 florins. In small payments, the Cologne mark of fine silver being reckoned at 16 rixdollars of account, or 24 florins, each of the coins is rated 20 per cent. higher than its value in convention money; the specie rixdollar passes for 2½ florins, the convention florin for 1½ florin, and the copfstuck for 24 creutzers. According to the Leipzig rate of coinage, the Cologne mark of fine silver was valued at 12 rixdollars of account, 9 effective rixdollars, or 18 florins; 8 specie rixdollars were to weigh a Cologne mark of silver, 14 loths 4 grains fine: in the smallest coins, such as double and single marien groschen, the mark of fine silver was coined at the rate of 12½ rixdollars. These coins are known by the name of "constitution coins:" 100 rixdollars, coined after the Leipzig rate, are worth 111½ convention rixdollars. The fineness of gold is valued all over Germany by dividing the mark fine into 24 carats, and the carat into 12 grains; the fineness of silver, by dividing the mark fine into 16 loths, and the loth into 18 grains. At Hamburg, the reichthaller, or rixdollar, is 3 marks, 48 shillings, or 576 pfenings; the rixdollar of exchange is 2 marks, 32 shillings, or 384 pfenings. The silver coins of this city are rixdollars reckoned at 3 marks specie, which commonly pass for ½ per cent. better than banco, or for 3 marks 12 shillings 5 pence Hamburg currency. All sorts of specie rixdollars, when they are full banco weight, are reckoned at 3 marks, with about ½ per cent. premium against banco, or at 4 marks light money, with about 33 per cent. discount below banco. But the value of a common specie rixdollar, in current money, is 3 marks 12 shillings, and the halves and quarters in proportion.

Accounts are kept in Sweden in riksdaler of 48 skilling, the skilling being subdivided into 12 runftycken or ore. By the regulations of 1777, the specie riksdaler was to pass for the same value that 6 silver dahler, or 18 kopper dahler, formerly did; and there were coined whole riksdaler, and pieces of ¾ds, ½d, ¼th, ⅓th, and ⅔th of a riksdaler. According to the mint regulations, the Swedish specie riksdaler should weigh 609 Swedish ascs, or 451½ English grains, and contains 535 ascs, or 396½ grains of fine silver; it is therefore worth 4s. 7½d. sterling, and the skilling 1½d. nearly. For the value of rixdollars, current in various places, according to the mint price of silver in England, see MONEY.

The rixdollar (constitution) of the Austrian dominions has on it the head of the reigning emperor, with name and titles, thus: CAR. VI. D. G. R. I. S. A. G. HI. H. BOH. REX; that is, *Carolus sextus, Dei gratia, Romanus imperator semper augustus, Germaniæ, Hierosolymæ, Hungariæ, Bohemiæ rex* (Charles VI. by the grace of God, emperor of Rome, ever august, king of Germany, Jerusalem, Hungary, and Bohemia); reverse, a two-headed eagle crowned, bearing on his breast the arms of Austria, and in his talons a sword and sceptre; legend, ARCHID. AUST. D. BU. M. MOR. COM. FY. (archduke of Austria, duke of Burgundy, marquis of Moravia, count of Tyrol), with the date; and on the edge of the piece, CONSTANTER CONTINET ORBEM, (he guides the globe steadily).

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The rixdollar (convention) has the head of the reigning sovereign, with name and title, thus: *M. THERESIA, D. GR. IMP. GE. III. BO. REG.* (Maria Theresa, by the grace of God, empress of Germany, queen of Hungary and Bohemia); reverse, as on the rixdollar constitution; the legend on the edge of the piece of Francis I. is, *PRO DEO ET IMPERIO* (for God and the empire). On that of Maria Theresa, *JUSTITIA ET CLEMENTIA* (justice and clemency). On that of Joseph II., *VIRTUTE ET EXEMPLO* (by virtue and example).

The rixdollar of Hungary has the head, name, titles, and legend, on the edge as above; reverse, the Virgin and Child, and the letters *K. R.*; legend, *S. MARIA, MATER DEI, PATRONA HUNG.* (Holy Mary, mother of God, patron of Hungary).

The florin, or half rixdollar, bears the same impressions as the rixdollar; as also the half florin.

The copfstuck, or copstick, (the 20 creutzer piece,) bears the same impressions as the rixdollar, except that there is no legend round the edge, and it is marked 20 on the reverse; the half copfstuck is marked 10.

The rixdollar of Baden has the head of the reigning prince, with name and title, thus: *CAROLUS FRID. MARCHIO BAD. ET H.* (Charles Frederick, marquis of Baden, &c.); reverse, arms of Baden; legend, *AD NORMAM CONVENTIONIS* (according to the rule of the convention); and at the bottom, the date, and *X EINE F MARCK* (10 pieces to a mark fine).

The thaler or rixdollar of Basil has the griffin, arms, and legend, as on the patagon; reverse, a wreath of laurels, inclosing the value, 1 *THALER*; legend, *MONETA REIPUB. BASILEENSIS* (money of the republic of Basil). The half piece is marked $\frac{1}{2}$ *THALER*; and the third is marked $\frac{1}{3}$.

The rixdollar of Bavaria has the head of the reigning prince, with name and titles, as in the gold coins; reverse, arms of Bavaria, and the date; and on other pieces, the Virgin and Child, with the legend, *PATRONA BAVARIÆ* (patroness of Bavaria); but the new rixdollar coined in 1800, bears the arms of Bavaria, and the legend, *PRO DEO ET POPULO*.

The rixdollar of Brunswick (old) has the head, name, and title of the reigning prince, as in the gold coins; reverse, the horse and legend as on the Carl d'or; but at the bottom there are *X EINE FEINE MARCK CONVENTION M.* (ten pieces to a mark fine, convention money).

The rixdollar of 1795 has on one side the words 1 *SPECIES THALER*, and the date; legend, *X EINE FEINE MARCK*, &c. as above; reverse, arms of Brunswick, with the name and title of the reigning prince.

The rixdollar of Cologne has the head of the reigning emperor of Germany, with his name and titles; reverse, arms of the city; legend, *MONETA NOVA LIB. ET IMP. CIVIT. COLON.*; that is, *Moneta nova liberæ et imperialis civitatis Colonienfis* (new coin of the free and imperial city of Cologne); and on some rixdollars, *MON. NOVA LIB. REIPUB. COLONIENSIS* (new coin of the free republic of Cologne).

In Denmark the ryksdaler (old), coined for Norway, has the head of the reigning king, with name and title, thus: *FRIDERICUS V. D. G. REX DAN. NOR. V. G. OR D. G. DAN. NORV. VAND. GOTH. REX* (Frederick V. by the grace of God, king of Denmark, Norway, the Vandals, and the Goths); reverse, a lion and battle-axe, with 6 *M.* (6 marks), and the following legend in the Norwegian language, in two concentric circles, *MOD TROSKAB DAPPERMED. OGH VAD DER GIVER ÆRE DEN HELEN VERDENBAND BLANT NORSKE KLIPPER LAERE*, which is thus translated: spirit, loyalty,

valour, and whatever is honourable, let the whole world learn among the rocks of Norway. On the same coin, of a later date, the legend is *TROE JOVE MOD OGH VAD DAN KONGENS GUNST KAND VINDE, MENS NORGE KLIPPE HAR MAN SKAL HOS NORDMAND FINDE*; that is, true lion's heart and whatever can win a Danish monarch's love, whilst Norway has rocks, shall be found among Norwegians.

The ryksdaler of 1777 has the king's cypher and a crown; legend, *D. G. DAN. NOR. VAND. GOTH. REX*, as before; reverse, arms of Denmark; legend, *GLORIA EX AMORE PATRIÆ* (glory from the love of our country), and the date.

The ryksdaler of 1795 has the head, name, and titles of the reigning king; reverse, arms of Denmark; legend, 1 *RIGSDALER SPECIE*, with the date.

The ryksdaler of Holstein has the head, name, and title, as above; reverse, arms of Denmark, and 1 *SP.*; legend, 60 *SCHILLING. SCHLESW. HOLST. COURANT* (60 schillings Sleswig and Holstein currency), with the date. The pieces of $\frac{3}{4}$ *ds* and $\frac{1}{4}$ *d* are marked $\frac{3}{4}$ *SP.* and $\frac{1}{4}$ *SP.*, and the number of schillings is also expressed: *SP.* means specie.

The rixdollar of Francfort has varied much in the impressions: most of them bear an eagle; but the reverses and legends are very different in coins of different dates; they may be easily distinguished by the word *FRANCKFURT* or *FRANCOFURT*, which is to be found on some part of the piece, as also the words *AD NORMAM CONVENTIONIS* (according to the rate of convention money), and *X E. F. MARK*, or *X EINE FEINE MARK* (10 to a mark of fine silver): these last words, within a circle or wreath, form the reverse of the more modern pieces; and coins of 1796 bear likewise the following German legend, *AUS DEN GEFESSEN DER KIRCHEN UND BURGER* (out of the plate of the churches, and of the citizens); and on the other side, *DER STADT FRANCKFURT* (of the city of Francfort).

The rixdollar specie or barco of Hamburgh has on the front the arms of Hamburgh; legend, *MONETA NOVA HAMBURGENSIS* (new coin of Hamburgh), and at the bottom, 48 *SCHIL. SPEC.*; reverse, a two-headed eagle crowned, with the name of the reigning emperor of Germany, thus: *JOSEPHUS II. D. O. ROM. IMP. SEMP. AUGUST.* (Joseph II. emperor of Rome, ever august).

The rixdollar of Hanover has the arms of the reigning king, with his name and title; reverse, a horse running over rough ground; legend, *NEC ASPERA TERRENT* (neither do rough places deter him), and the date. Some rixdollars bear a figure of St. Andrew on the cross; legend, the king's German titles.

The rixdollar convention of Hesse has the head of the reigning prince, with name and titles, thus: *WILHELMUS IX. D. G. HASS. LANDO. HAN. COM.* (William IX. by the grace of God, landgrave of Hesse, count of Hanau); reverse, arms of Hesse Cassel; legend, *X ST. EINE FEINE MARCK* (10 pieces to a mark fine), and at the bottom the word *JUSTIRT* (adjusted or verified). In pieces of more modern date, 1796, &c. this last word is not to be found, but under the above legend the words *BIBERER SILBER* (silver of the mine of Biber); and in some pieces of 1770, the words *EX VISCERIBUS FODINE BIBER* (from the bowels of the mine of Biber). The half and quarter rixdollars are marked *XX ST.*, &c. and 40 *ST.*, &c. and under the coat of arms $\frac{2}{3}$ or $\frac{1}{3}$.

The thaler or rixdollar of account has the head, name, and title, as above; reverse, a star with a lion in the centre, and the words *VIRTUTE ET FIDELITATE*, as before; or the arms of Hesse; the legend, in both cases, is *EIN THALER* (one thaler): and on the half piece, *EIN HALBER THALER*.

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The rixdollar or 3 markpiece of Lubec has a two-headed eagle crowned, with 48 on its breast; legend, *MON. NOV. IMP. CIVITAT. LUBECÆ* (new coin of the imperial city of Lubec); reverse, arms of the city; legend, 48 *SCHILLING COURANT GELDT ANNO, &c.* (48 schillings currency; the year, &c.)

The rixdollar (fine) of Manheim has the head of the reigning prince, with name and title, thus: *CAR. THE. C. P. S. R. I. A. T. & EL.*; that is, *Carolus Theodorus, comes palatinus, sancti Romani imperii archi thesaurarius et elector* (Charles Theodore, count palatine, high steward and elector of the holy Roman empire); reverse, arms of the prince; legend, *EX VISCERIBUS FODINÆ WILDBERG* (from the bowels of the mine of Wildberg), and *FEIN SILB.* (fine silver) at the bottom.

The piece of $\frac{2}{3}$ bears the same impressions as the rixdollar, except that it is marked ($\frac{2}{3}$) under the arms. Some pieces of an ancient date bear no head but $\frac{2}{3}$ in large figures, and under this, *FEIN SILBER*; legend, *DEUS SERVET METALLI FODINAS MONTENSES* (may God preserve the mines of Wildberg); the names and titles are on the reverse, round the arms.

The rixdollar (convention) has the head, name, and titles, as above; reverse, arms of the prince; legend, *AD NORMAM CONVENTIONIS* (according to the rule of the convention); or *10 EINE FEINE MARCK* (10 to a fine mark).

N. B. The coins of Manheim and the Palatinate now bear the same impressions as those of Bavaria, both countries being united under one sovereign.

The rixdollar of Mentz has the head of the reigning prince, with name and titles, thus: *FRID. CAR. JOS. D. G. A. EP. MOG. S. R. I. P. G. A. C. ET EL. E. W.*; that is, *Fredericus Carolus Joseph Dei gratia archiepiscopus Moguntie, sancti Romani imperii pro Germania archi cancellarius et elector, episcopus Wormensis* (Frederick Charles Joseph, archbishop of Mentz, high chancellor for Germany and elector of the holy Roman empire, bishop of Worms); but the pieces of 1796, &c. have their legend in German, thus: *FRIED. CAR. JOS. ERZB. U. KURF. Z. MAINZ. B. Z. W.*; that is, *Erzbischoff und Kurfurst zu Mainz Bischoff zu Worme* (archbishop and elector of Mentz, bishop of Worms); reverse, arms of the bishop; legend, *ZEHEN EINE FEINE MARCK* (ten to a mark fine).

The rixdollar (constitution) of Nuremberg has the head of the reigning emperor, with name and title, thus: *CAROLUS VI. D. G. ROM. IMP. SEMP. AUG.* (Charles VI. by the grace of God, emperor of Rome, ever august); reverse, a view of the city, with an eagle flying over it; legend, *AUGUSTO DOMINO TUTA ET SECURA PARENTE EST* (it is safe and secure under its august lord and father), and at the bottom, *NORIMBERGA.*

The rixdollar (convention) varies in the impressions, some bearing the head, name, and title of the reigning emperor, as above; and others a view of the city, with a sun over it; reverse, a two-headed eagle crowned, bearing the arms of the city on its breast; or a single-headed eagle carrying two escutcheons in his talons. The pieces are marked with the letter *N.*, or the word *NURNBERG*, or the legend, *MONETA NOVA REIPUBL. NORIMBERGENSIS* (new coin of the republic of Nuremberg); and the words, *X EINE FEINE MARCK* (ten to a mark fine), are also to be found in some part of the piece.

The rixdollar of Prussia (coined before 1791) has the head of the reigning king, with name and title, thus: *FRIEDERICUS BORUSSORUM REX* (Frederick king of Prussia); reverse, an eagle and military trophies; legend, *EIN REICHS THALER* (one rixdollar). The half rixdollar bears the same

impressions; and its value is marked thus, *2 EINB RATHALER* (two to a rixdollar).

The rixdollar current (coined since 1791) has the head of the reigning king, and the legend in German, as before; reverse, arms of Prussia, with *EIN THALER* at the bottom; but the rixdollar convention money bears the legend, *ZEHN EINE FEINE MARCK* (ten to a mark fine).

The florin of Silesia has the same impressions as on the rixdollar of 1791; but on the reverse it is marked *XXI EINE FEINE MARK.*

The rixdollar of Anspach and Bareuth has the head of the reigning prince, with name and title, thus: *ALEXANDER D. G. MARCH. BRAND.* (Alexander, by the grace of God, marquis or margrave of Brandenburg); reverse, arms of Anspach, &c. with *ZEHEN EINE FEINE MARK* (ten to a mark fine); but those of modern date, 1790, &c. bear the impressions of the Prussian coins, Anspach having been at that period ceded to Prussia.

The rixdollar of Ratibon has the head, name, and title of the reigning emperor, as on the coins of Hamburg and Nuremberg; reverse, a view of the city; legend, *MONETA REIP. RATISPON* (coin of the republic of Ratibon), and at the bottom, *X ST. EINE F. C. M.*; that is, *X Stück eine feine Colnisch marck* (ten pieces to a mark fine, Cologne weight). The half and quarter rixdollars are marked *20 ST. EINE F. C. M.* and *40 ST. EINE F. C. M.*

The rixdollar of Saltzburg, and its divisions, has the head of the reigning prince, with name and titles, thus: *HIERONYMUS D. G. A. & P. S. A. S. L. N. G. PRIM.*; that is, *Hieronymus Dei gratia archiepiscopus et princeps Salisburgensis, Germanie primas* (Jerome, by the grace of God, archbishop and prince of Saltzburg, primate of Germany); reverse, arms of the reigning prince, without a legend; and the copfituck or 20 creutzer piece differs only in being marked (20) on the reverse.

The rixdollar (convention) of Saxony has the head of the reigning prince, with name and titles, thus: *FRID. AUGUST. D. G. DUX SAX. ELECTOR* (Frederick Augustus, duke and elector of Saxony); reverse, arms of Saxony, with the inscription, *X EINE FEINE MARCK* (ten to a mark fine).

The florin or piece of $\frac{2}{3}$ bears the same impressions as the rixdollar; but the inscription on the reverse is *XX EINE FEINE MARCK*, and it is marked $\frac{2}{3}$ at the bottom; the half florin is marked *XL EINE*, &c. and $\frac{1}{3}$ at the bottom; and the quarter florin is marked *LXXX* or *ACHZIG EINE*, &c. and $\frac{1}{4}$.

The rixdollar of Saxe Gotha has the head, name, and title, of the reigning prince, thus: *ERNESTUS D. G. GOTHAN. SAXONUM DUX* (Ernest, by the grace of God, duke of Saxe Gotha); reverse, arms of Saxe Gotha, with *X EINE FEINE MARCK*, as above.

The rixdollar of Sweden of 1752 has the head of the reigning king, with name and title in Latin, thus: *GUSTAVUS III. D. G. REX SUECIE* (Gustavus III. by the grace of God, king of Sweden); reverse, arms of Sweden; legend, *SALUS PUBLICA SALUS MEA* (the public safety is my safety); and on the edge, *MANIBUS NE LÆDAR AVARIS* (that I may not be hurt by rapacious hands). The half rixdollar bears the same impressions.

The rixdollar of 1779 has the head, name, and title, as before; reverse, arms of Sweden, with *1 RD.*; legend, *FADERNES LANDET* (the land of our fathers). The divisions of the rixdollar bear the same impressions, but have their value marked on them, thus: $\frac{2}{3}$ RD., $\frac{1}{3}$ RD., $\frac{1}{6}$ RD. The rixdollar, and other pieces coined since 1795, have the legends on both sides in the Swedish language. The inscription

tion on the edge of the piece is MANIBUS, &c. as on the old rixdollar.

The rixdollar of Friburg, and its divisions, have the arms of the canton; legend, *REPUBLICA FRIBURGENSIS* (republic of Friburg); reverse, a cross formed by eight F's, and four crowns; legend, *AUXILIUM NOSTR. DEUS* (God is our help). The quarter rixdollar has, on a square in the centre of the cross, the number 56; and the inferior divisions are marked 28, 14, and 7.

The rixdollar of Treves has the head of the reigning prince, with name and titles, thus: *CLEM. WENC. D. G. A. EP. TREV. S. R. I. A. C. ET EL.*; that is, *Clemens Wenceslaus Dei gratia archi episcopus Treuirensis sancti Romani imperii archi cancellarius et elector* (Clement Wenceslas, by the grace of God, archbishop of Treves, arch chancellor and elector of the holy Roman empire); reverse, arms of the prince; legend, *EPISC. AUG. APP. COAD. ELEC.* (bishop of Augsbourg, and other titles), besides the words, *IO EINE MARC F. OR IO EINE FEINE MARK* (ten to a mark fine).

The rixdollar of Wurtemberg has the head of the reigning prince, with name and title, thus: *CAROL. ALEX. D. G. DUX WUR. ET T.* (Charles Alexander, by the grace of God, duke of Wurtemberg, &c.); reverse, arms of Wurtemberg; legend, *PROVIDE ET CONSTANTER* (providently and constantly), besides the words, *IO EINE FEINE MARK* (ten to a mark fine).

The rixdollar of Wurtzburg (coined before 1795) has the head of the reigning prince, with name and titles, thus: *FRANC. LUD. D. G. EP. BAM. ET WIR. S. R. I. P. F. O. DUX*; that is, *Franciscus Ludovicus Dei gratia episcopus Bambergii et Wirzburgii, sancti Romani imperii princeps, Francorum Orientalium dux* (Francis Louis, by the grace of God, bishop of Bamberg and Wurtzburg, prince of the holy Roman empire, duke of East Franconia); reverse, arms of the bishop, legend, *IO EIN FEINE MARCK* (ten to a mark fine). But the rixdollar of 1795, &c. bears on the front the head of the bishop, with names and titles as above; and on the reverse only the words, *IO EINE FEINE MARCK*, encircled by two sprigs of laurel; and above it the legend, *PRO PATRIA* (for the country). See Kelly's Cambist, vols. i. and ii.

RIXI, in *Geography*, a town of Hindooftan, in Bahar; 23 miles S. of Palanow.

RIXOUSE, LA, a town of France, in the department of the Jura; six miles N. of St. Cloude.

RIXTOWN, a town of the duchy of Holstein; seven miles S.W. of Lutkenberg.

RIZAH, a town of Asiatic Turkey, in the government of Trebifond, near the Black sea; 45 miles E.N.E. of Trebifond. N. lat. 48° 9'. E. long. 40° 20'.

RIZEA, in *Ancient Geography*, a town of Asia, in that part of the Colchide, which lay to the left of the Phasis. Procopius says, that it was situated on the frontiers of the empire, and that it was very populous.

RIZIUM, in *Botany*, a name given by the ancients to a peculiar kind of red root brought from Syria, and used by the Grecian women to paint their cheeks red.

The Latin writers, who have mentioned this, have called it *radicula*; and Pliny, who has more than once mentioned it, calls it *herba lanaria*, or *radix lanaria*. This, however, is a very great error, confounding it with the *struthium* of the Greeks. It is probable, that the rizium was no other than the anchusa, or alkanet root, which grows very plentifully in the countries from whence the Greeks had their rizium, and which will answer all the purposes for which they used it.

RIZOA, so named by Cavanilles, Ic. v. 6. 56. t. 578,

after Salvator Rizo, a botanical artist employed by Mutis, is a genus of the *Didynamia Gymnospermia*, whose distinctive characters are scarcely sufficiently marked, for us, without a specimen, to decide concerning it.

The species is *R. ovatifolia*, an herbaceous plant of Chili, flowering there in February. *Corolla* pale rose-coloured.

RIZSKOI, in *Geography*, a province of Russia, formerly Livonia, so called from Riga, its capital; bounded on the N. by Revelskoi, on the E. by the government of Petersburg and Pskov, on the S.E. by Polotzkoi, on the S. by Semigallia, and on the W. by the gulf of Riga; about 160 miles long, and 100 broad. N. lat. 56° 30' to 59° 15'. E. long. 24° to 27° 34'.

RIZZIO, DAVID, in *Biography*, born at Turin, but brought up in France, was a good musician, and sung agreeably. His father was a dancing-master. The count de Merezzo took him to Scotland, when he went thither ambassador from Savoy. Rizzio charmed the queen by his talents, which were not confined to music, and there were rumours that she favoured him too much. Henry Stuart Darnley, the queen's husband, had him arrested in the music room of this princess. But it is said, in some accounts, that he was actually at supper with her majesty and the countess of Argyle in her cabinet. Some say that he was massacred in her presence; others assert, that the duke of Rothsay dragged him out of the room and murdered him at the door. There is no doubt but that the queen made useless efforts to save his life; (but to save the life of a cat, a dog, or a squirrel, common humanity would naturally have done as much). However, it is added, that she revenged his death afterwards on several of his assassins. Laborde.

We wished to know what foreigners say of this transaction, as partly concerning Mary, queen of Scotland, ran so high at the time, and it still runs, that there is no great credit to be given to either side.

His instrument seems to have been the lute, the general favourite at that time all over Europe.

At Turin, some years ago, among many other musical enquiries, David Rizzio was not forgotten. Imagining, as he was a native of that city, and his father a musician as well as a dancing-master there, if we could find any music composed by either of them or by their Italian contemporaries, it might determine the long disputed question, whether David Rizzio was author of the Scots Melodies ascribed to him. The result of this enquiry is related in the article **JAMES I.** king of Scotland; which see.

Sir John Melvil, in his Memoirs, tells us that "the queen had three valets of her chamber, who sung in three parts, and wanted a base to sing the fourth part; therefore, telling her majesty of this man, Rizzio, as one fit to make the fourth in concert, he was drawn in sometimes to sing with the rest." This was about the year 1564.

He quickly crept into the queen's favour; and her French secretary happening at that time to return to his own country, he (Rizzio) was preferred by her majesty to that office. He began to make a figure at court, and to appear as a man of weight and consequence. Nor was he careful to abate that envy which always attends such an extraordinary and rapid change of fortune. On the contrary, he seems to have done every thing to increase it; yet it was not his exorbitant power alone which exasperated the Scots; they considered him as a dangerous enemy to the Protestant religion, and held for this purpose a constant correspondence with the court of Rome. His prevalence,

prevalence, however, was very short lived; for, in 1566, certain nobles, with lord Darnly at their head, conspired against him, and dispatched him in the queen's presence with fifty-six wounds. Biog. Dict. vol. xi. p. 94.

RIZZUTO, CAPE, in *Geography*, a cape on the coast of Calabria. N. lat. $38^{\circ} 57'$. E. long. $17^{\circ} 25'$.

ROA, a town of Spain, in Old Castile, on the Duero; 25 miles N. of Segovia.

ROACH, in *Ichthyology*, the English name of a well-known fish, called by the generality of authors the *rutilus* and *rubiculus*, by some the *rubellio*. It is a species of the cyprinus according to the new system of Artedi, and the cyprinus rutilus of Linnæus. It has been deemed, though without much reason, remarkable for its liveliness and vivacity; whence the proverb, *found as a roach*.

In some parts of the world this fish will only live in standing waters; with us it equally thrives in ponds and in deep still rivers, and is remarkable for its numerous progeny; a pond being much sooner stocked with this than with any other fish.

ROACH *Fishing*. See FISHING.

ROACH-*Leech*, in *Sail-making*, the mast-leece of sails cut with a curve, or roach.

ROACHING of Alum, one of the last processes used in the alum making, and is what renders it fit for the market.

After the alum liquor has been left four days in the cooler, and is sufficiently shot, they drain it out; and taking out the alum, they wash it in a cistern of alum water so strong, that it can scarcely take up any more of that salt, but only cleanses it of its accidental foulness. After this washing the alum is put into large pans, and a quantity of water added to it. It is set over the fire to melt in this water and boil a little; then it is scooped into a great cask, where it is suffered to stand about ten days; and it is then fit for the market under the name of *roach alum*, or *roached alum*; the liquor let out of the cooler is boiled up again, and shoots more alum. See ALUM.

ROAD, VIA, an open way or passage, forming a commodious communication between one place and another.

The Romans, of all people, took the most pains in their roads; the labour and expence they were at to render them spacious, straight, smooth, and agreeable, to the very extremities of their empire, are incredible.

Usually, they strengthened the ground by ramming it, laying it with flints, pebbles, or sand; sometimes by a lining of masonry, rubbish, bricks, potshreds, &c. bound together with mortar.

F. Menestrier observes, that in some places in the Lyonsnois he has found huge clusters of flints cemented with lime, reaching ten or twelve feet deep, and making a mass as hard and compact as marble itself; and which, after resisting the injuries of time for sixteen hundred years, is still scarcely penetrable by all the force of hammers, mattocks, &c. and yet the flints it consists of are not bigger than eggs.

Sometimes they even paved their roads, regularly, with large square free-stones: such are the Appian and Flaminian ways, &c.

The roads paved of very hard stones, they usually called *via ferrea*, either because they resembled iron, or because they resisted the iron of the horses feet, chariots, &c.

Roads are either *natural* or *artificial*, *terrestrial* or *aquatic*, *public* or *private*.

ROAD, *Natural*, is that which has been frequented for a long succession of time, and subsists with little expence by reason of its disposition, &c.

ROAD, *Artificial*, is that made by labour of the hand, either of earth or masonry; and in the making of which, several difficulties were to be surmounted; such are most of those along the banks of rivers, and through marshes, lakes, &c.

ROADS, *Terrestrial* or *Land*, are not only those made upon the ground, but also those formed of earth heaped up in manner of a bank, and sustained by spurs, buttresses, and counterforts.

ROAD, *Aquatic*, is a road made in the waters, whether current, as those of rivers, &c. or stagnant, as banks and causeways, or over morasses, &c.

Under this denomination are also comprehended navigable rivers, and artificial canals. See CANAL.

ROAD, *Public*, or *grand road*, is any common road, whether straight or across, military or royal, &c. *Private* road is that made for the convenience of some particular house, &c. See HIGHWAY.

ROADS, *Military*, so called among the Romans, were grand roads appointed for the marching of their armies into the provinces of the empire, for the assistance of their allies, &c.

The principal of these roads, in England, are Watling-street, Ikenild-street, Foss-way, and Erminage-street. See WAY.

ROADS, *Double*, among the Romans, were roads for carriages, having two pavements or causeways, the one for those going one way; the other for those returning the other, to prevent clashing, stopping, and confusion.

These two ways were separated from each other by a bank raised in the middle, paved with bricks, for the convenience of foot people, with borders and mounting stones from space to space, and military columns to mark the distance. Such was the road from Rome to Ostia, called *Via Portuensis*.

ROAD, *Subterraneous*, is that dug in a rock with a chissel, and left vaulted. Such is that of Puzzuoli, near Naples, which is near half a league long; and is fifteen feet broad, and as many high.

Strabo says, it was made by one Cocceius, a relation probably of Nerva; but it has since been widened by Alphonus, king of Arragon and Naples, and made straight by the viceroys. There is another of the same kind in the same kingdom, between Baix and Cumæ, called the Grotto of Virgil, because mentioned by that poet in the sixth book of his *Æneid*.

ROAD, in *Rural Economy*, a track or way constructed with some sort of hard materials for the purpose of travelling upon, with carriages, horses, and other animals. Roads are of different kinds, as public and private, or parochial. The first sort may be subdivided into toll and free-roads, and the latter into lanes or bye-roads: there are likewise other sorts of roads, as carriage and horse tracks, &c. It has been remarked by a writer, in the first volume of "Communications to the Board of Agriculture," that the conveniences and beneficial consequences which result from a free and easy communication between different parts of a county and district are so various, and the advantages of them so generally and extensively felt by every description of individuals, from the highest to the lowest; that no labour or expence should be spared in providing them; as, without such ready means of intercourse, all sorts of internal commerce and improvement are either much embarrassed, or wholly at a stand. And it is, indeed, well added, that roads and canals, or navigable rivers, may justly be considered as the veins and arteries through which all improvements flow. To internal commerce and agriculture,

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culture, they are as the veins and arteries to the human body. Through these the blood circulates in every direction, and thus keeps alive the animal system; but, if this circulation is by any means checked or obstructed, even in the remotest part, that part soon becomes useless, and sinks into decay, and in some degree is felt throughout the whole body. So it is with respect to the commercial and agricultural systems. Without a free and uninterrupted intercourse, it is impossible they can exist, or at least produce, to the community at large, so many important benefits as they otherwise might have done. How many, for example, are the places, in almost every country, that might be rendered doubly valuable, if the access were practicable and easy. How immense the quantities of the finest timber, perhaps growing in inaccessible woods, which, on that account alone, are lost to society. How many the valuable strata of the richest metals and minerals, which, from the same cause, lie buried and undisturbed in the bowels of the earth; and how many thousands of acres of the most fertile soil, that might be improved and cultivated to the highest degree of perfection, and thus very largely contribute to increase the food and the comforts of man, were the ingress and egress rendered practicable and free. And the value of a farm, consequently the riches, perhaps the strength of a country, greatly depend on an easy and uninterrupted communication by good roads.

And the able author of the "Wealth of Nations" has well suggested, that good roads, canals, and navigable rivers, by diminishing the expence of carriage, put the remote parts of the country more nearly upon a level with those in the neighbourhood of the town. They are, upon that account, the greatest of all improvements. They encourage the cultivation of the remote, which must always be the most extensive circle of the country. Though they introduce some rival commodities into the old markets, they open many new markets to its produce. It is even further observed, that the Romans were so sensible of this, that we are told, the first writer says, they did not think it beneath the dignity of the commonwealth to attend to the conveniences from good roads. That great and wise people, it is said, carried on, at an immense expence, roads, whose remains are to this day the admiration of the curious, from the centre of the empire to many of the remote provinces. The readier march of their armies was, perhaps, he thinks, their first motive; but the easier intercourse of the several parts of the great empire was another, which they had too much prudence and too much wisdom to overlook. We are also told by Diodorus, Strabo, and other historians, he says, that the famous Semiramis, being so fully convinced of the importance of an easy and general intercourse, applied herself to render the roads practicable throughout the whole extent of her empire.

Mr. Donaldson also states, that, in an agricultural view, the benefits derived from good roads are incalculable. Before the establishment of turnpike roads in England, many parts of that kingdom, like the highlands of Scotland, were scarcely accessible. Coal, manure, grain, &c. as is still the case in many parts of Cornwall, were carried on horses' backs. Where waggons were used, seven or eight horses were necessary to draw about two tons, and seldom were able to proceed above twenty miles in a day. Now, where turnpikes are established, or other means used for keeping the roads in a proper state of repair, the same number of horses will draw at least five tons, and travel nearly double the distance, with much more ease. How absurd, then, continues he, for any person to scruple the payment of an in-

considerable toll, when the saving is so great and so evident; where the tear and wear in one case are not one-twentieth part of what they are in the other!

It is likewise contended by Mr. Beatson, in respect to the turnpike laws in this country, that they are liable to many exceptions; for although immense sums of money are annually levied for the purpose of making and repairing the highways, yet, either from bad management, from party influence, or from the chicanery and ignorance of surveyors and contractors, the roads in many places are not only laid out in the most absurd direction, but are so badly constructed, and kept in so wretched a state of repair, that they are almost impassable. It is surprising that in so enlightened a country, and where the turnpike laws have so much engaged the attention of many very ingenious men, those laws should still remain so very defective; more especially as there is hardly a country gentleman who attends a turnpike meeting, but considers himself completely master of the whole business and management, as well as of the making of roads; at least, if we may judge from the violent disputations and bickerings that frequently happen at these meetings, where a proposed new line of road, or perhaps the repair of an old one, will sometimes be contested with as great keenness and vehemence, as if the parties were contending whether Great Britain shall be a monarchy or a republic. And it is contended, that it too often happens party influence rules the proceedings at such meetings, and that those who are entrusted with the management of this business, delegate their powers, and trust the inspection and whole management and direction of the roads to some ignorant or pretended surveyor; who, almost to a certainty, will impose upon them, especially if he is empowered to settle with contractors; and thus the business of the public, in one of its most important concerns, is either altogether neglected, or terminated according to the convenience of the strongest party, without any regard to the interests of the community at large. In support of this assertion, he has only to refer to many parts of the principal thoroughfares in Britain. In some, it will be observed, the roads are directed in the most irregular zigzag manner, through a level part of the country, where they ought evidently to have gone straight forward. In other places, the traveller and the public, and the poor overloaded horse, are obliged to submit to all the inconvenience, the labour, and the fatigue of ascending and descending the steepest hills, when they might have gone, with the greatest ease and comfort, on a level road, by proper attention in the first making and laying them out. He is, however, far from thinking it would either be just or proper, to force a road unnecessarily through any part of a gentleman's property without his consent, unless for very powerful reasons indeed.

If to avoid a deep ascent, or to shorten the distance considerably, and that there is no other way to do so, in that case there should be no hesitation; but if the advantages to the public are not very material, and that another line can be adopted, nearly as good, which will do less injury to an individual, the latter line should unquestionably be preferred in all such cases of laying out roads.

It should be a general maxim, he thinks, that private considerations ought, in all cases, to give way to public convenience and advantage. Society, says he, is formed for the mutual and general benefit of the whole, and it would be a very unjust measure to incommode the whole, merely for the convenience, or perhaps to gratify the whim or caprice of an individual. However, the property of an individual ought by no means to be taken to serve the

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public, without allowing him, not only the full value, but more than the value proportioned to the inconvenience or injury he may sustain by the measure.

But he contends, farther, that while the present turnpike laws remain in force, and the common mode is practised of choosing surveyors annually, or by rotation, without the smallest regard to abilities or experience, it cannot be expected the public convenience will be so much attended to as it ought to be; neither is it to be expected, that the generality of surveyors, so chosen, can know the proper directions to give in making or repairing roads, nor the proper manner of making estimates, so as either to conclude an agreement with an artful contractor, or to form a correct judgment of such proposals as may be made. From these disadvantages, it is inconceivable the loss that may be occasioned, or the mischief that may be done by an ignorant and inexperienced surveyor. For he is decidedly of opinion that a surveyor of roads should be a man of considerable abilities, and of the strictest honour and integrity. A man not apt to be swayed by party influence, or by private or personal considerations; for if he once allows himself to be led away or biased by those, or to act in any manner inconsistent with the public interests, he is unfit for that office. He ought not to be a man, who has all his life-time been confined to the narrow limits of a single district or county, or who has suddenly, or by a slender recommendation, been brought forward as a person qualified for so arduous an undertaking. He ought to have seen, in various places, the different systems adopted in the management and construction of roads, and to have made it a particular object of his attention, the judging of the best and most advantageous practices, under the particular circumstances of different cases. And besides these, there is another probable reason why, under the present system, the public roads cannot be so impartially managed and conducted as they ought to be, in the unlimited power given to country gentlemen over the roads in the county or district in which they live. Many of those gentlemen, for their benevolence and liberality, are truly deserving of every praise that can be bestowed upon them; but, however honourable and respectable they may be, and however desirous to promote the public good, it would be doing an injustice to human nature to suppose they can view, with impartial eyes, the fine plantations, the beautiful inclosures, and other improvements, they have made on their estates. We may as well imagine, that a dotting mother can coolly and deliberately see an incision made in the skin of her darling child, however much it may be benefited by the operation, as that a country gentleman can with indifference behold a turnpike road carried through an inclosure, which he himself has been at the pains and the expence of adorning. He adds, that so situated, it is natural to believe this gentleman would wish that road to go in any other direction, even though it should not be quite so convenient to the public. He will not only use his own persuasion and endeavours to point out arguments against its coming that way, but he will even endeavour to prevail on his friends to exert themselves also, and thus a party is often formed in opposition to the public interest; and if he is a man of opulence and power, and generally respected, it is more than probable his influence will prevail in this business.

It consequently appears to him necessary, in order to obviate these abuses and inconveniencies, that there should be a controlling power over the measures proposed by country gentlemen respecting turnpike roads: for to allow those gentlemen to decide ultimately on the laying out a

new road through their own lands, or even on the distribution of the money to be expended in repairing old roads, is, in fact, making them judges in their own cause. In short, it is an object so truly important to the interests of the community at large, and of the kingdom in general, to procure the most easy, safe, and expeditious, and the least expensive intercourse with every part, by means of the best roads, that it is a measure, he presumes, highly deserving the attention of the legislature; and which, from the great extent of business, would probably require a board, with proper surveyors appointed by it, for the purpose. If some plan of this nature were adopted, we should then hear no more of those numerous complaints that are so often made respecting the abuses committed in the management of turnpike roads, and of the money levied at the toll-bars, at many of which, it is said, by the author of the "Wealth of Nations," the money levied is more than double of what is necessary for executing, in the completest manner, the work which is often executed in a very slovenly manner, and sometimes not executed at all.

But in respect to the improvement of both the public and private roads, the following hints have been thrown out in the able Agricultural Survey of Shropshire. In lieu of surveyors in each parish (who are generally chosen in turn, and consequently have neither time nor experience sufficient to act properly, and are generally not inclined to exert themselves by enforcing the duty, &c.), the writer would propose for the magistrates to have power to appoint a proper surveyor with a salary, who should act under their direction, and be amenable to them for his conduct; such surveyor to undertake the arrangement of a certain district (say ten miles square), whose duty it should be to employ deputies, to call in and see the statute duty done under his direction: by this means the forming of the roads, which is the first principle, would be done in the most approved method, and the statute duty regularly called out. There may be an inspector, an inhabitant in each parish, appointed, and chosen yearly, whose interest it would be, as well as his duty, to act as a check upon the general surveyor and his deputy: this office, being easy, might be filled by one of the most liberal persons in the parish. He apprehends that an arrangement of this sort would very soon insure good private roads. And something like the following would, he thinks, procure good turnpike roads also; namely, the trustees of all the turnpike roads throughout England, to be obliged to erect weighing engines at all their gates or bars, at which tolls are received, on or before the 24th day of June next, the expence of such erections to be repaid to them, by their being empowered to add to their present respective tolls any sum to be paid by such carriage to be weighed, not exceeding so much as has been heretofore paid within one year last for the tolls; such sums to be paid, until all expence of erecting the said engines shall be fully repaid. The account of such repayment to be made out and settled by the clerks and gate-keepers belonging to the respective roads, and to be attested upon oath before two justices of the peace. And from and after the said 24th day of June next, it may be lawful for all carriages to be drawn with any number of horses along any turnpike road. But to prevent the injuries done to roads, by the great burdens too frequently drawn along them, it should be enacted, that from and after the said 24th day of June, it should be lawful for all trustees appointed by any act or acts of parliament, for the repair of any turnpike road, or any five or more of them, and they should be required at a public meeting, to be held for

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for that purpose on or before the 24th day of April next, to order to be erected at all the gates and bars which they have erected, or shall erect, for the receiving of tolls, or upon any part of the road within their respective jurisdictions, and at such a distance from any turnpike, bar, or toll-gate, as they shall think requisite and expedient to order and cause to be erected, a crane, machine, or engine, proper for the weighing of carts, waggons, or carriages conveying any goods or merchandize whatever; and by a writing signed by them, or any five or more of them, to order all and every such carriage or carriages which shall pass loaded through any such gate or bar, to be weighed, together with the loading thereof; and for them, or any five or more of them, or for any person or persons empowered by any five or more of them, to receive and take, over and above the tolls already granted, or hereafter to be granted, the sum of 10*s.* for every hundred weight, 112*lbs.* to the hundred, which every waggon or cart hereafter described, together with the loading thereof, shall weigh over and above the weights hereafter allowed to them respectively; that is to say, to every waggon or four-wheel carriage, having the fellies or rollers of the wheels of the breadth of sixteen inches, eight tons in summer, and seven in winter: to every waggon or wain, having the axle-trees thereof of such different lengths, that the distance from wheel to wheel of the nearer pair of the said wheels be not more than four feet two inches, to be measured at the ground, and that the distance from wheel to wheel of the other pair thereof be such, that the fore and hind wheels of such waggons and wains shall roll only one single surface or path of sixteen inches wide at the least, on each side of the said waggons or wains, and having the fellies thereof of the breadth of nine inches from side to side at the bottom or sole thereof, six tons ten cwt. in summer, and six tons in winter: to every waggon or four-wheel carriage, having the sole or bottom of the fellies of the wheels of the breadth of nine inches, six tons in summer, and five tons ten cwt. in winter: to every cart, having the fellies of the same dimensions, three tons in summer, and two tons fifteen cwt. in winter: to every waggon, having the sole or bottom of the fellies of the wheels of the breadth of six inches, four tons five cwt. in summer, and three tons fifteen cwt. in winter: and to every such waggon, so constructed as to roll, and actually rolling a surface of eleven inches by the wheels thereof, five tons ten cwt. in summer, and five tons in winter: to every cart having the fellies of the same dimensions, two tons twelve cwt. in summer, and two tons seven cwt. in winter: to every waggon, having the sole or bottom of the fellies of the wheels of less breadth than six inches, three tons fifteen cwt. in summer, and three tons twelve cwt. in winter: and to every cart, having the fellies of the same dimensions, one ton fifteen cwt. in summer, and one ton to twelve cwt. in winter. And if such trustees as aforesaid shall neglect to erect such engine at their respective gates by the said 24th day of June, then it shall and may be lawful for any mortgagee or mortgagees of the said gate or gates to erect such engine or engines, and to take upon them the same power as the said trustees were by the act invested with, and under the same regulations, on or before the 29th day of September next; and if the said trustees and mortgagees shall neglect to erect such engine or engines by the respective times hereinbefore stipulated for erecting the same, then it shall and may be lawful for all horses, carts, and other carriages, from and after the said 29th day of September next, to go through and pass along such road or roads, without any obstruction or payment for tolls whatsoever, until such

trustees or mortgagees shall erect such weighing engine or engines as aforesaid, and occasion the same to be regularly used; any thing contained within the respective acts for turnpike roads to the contrary notwithstanding.

And it is usefully remarked, in respect to the effects of these regulations, that, first, the weighing engines will sufficiently prevent carriages of all sorts being overloaded, which will be a preservation of the road, whereas, the restraint upon the number of horses does not answer the purpose; for a short and overpowered team does more damage to the roads, than a greater number of horses, which draw easy, and consequently pass along much quicker. That disagreeable restraint will be thereby made unnecessary, which empowers and encourages some poor indolent wretches to wander about the country with their ready printed notices, to catch a prey, which, when got, is lavished away in drunkenness, debauchery, and disorder; and if they fail in their lawful attempt, which is often the case, and perhaps distressed to the greatest degree, being despised by persons of all denominations, pursue poaching and fowl-stealing, which lead to greater acts of thievery, of which there are many instances; for all the convictions are grounded upon the poor wretches as above described, being by the law allowed to be credible witnesses, who obtain the reward to the amount of 5*l.* or more, when the team-owner's servant or servants are all deemed prejudiced; so that, as the act now stands, no one is safe from these convictions.

Besides, the occupiers of farms in general, particularly those upon the middling-sized ones, find themselves, it is said, very much oppressed and injured by the law now subsisting for regulating the turnpike roads, by their being restrained from drawing more than four horses in waggons, the fellies of the wheels thereof being under six inches broad. Were farmers permitted to draw any number of horses, it would be of great public utility in lowering the price of those animals, which is now enormously high; the farmer would find it his interest, as formerly, to keep breeding mares, which, with the colts they breed, may be made useful great part of the year, provided they may be worked easy. The law, as it now stands, acts nearly as a prohibition to farmers breeding horses; for a breeding mare, or a colt under five years old, is not fit to draw one of four in a waggon, with no more than sixty bushels of barley or wheat, which is the common load of the Shropshire or Staffordshire farmers, neither of which bring more than two tons, which is considerably under the weight the present act allows to be drawn on the turnpike roads in winter. Before the said turnpike laws were in force, the farmer's team, to draw his sixty bushels of wheat or barley, consisted of six in number, two of which at least were mares, either in foal or sucklers, two colts, one of them two, the other three years old, which were never oppressed or hurt by their work; consequently a succession came on, and the owner had one or two good sound colts to sell off every year to the harness or draft, as they best suited. Good waggon horses were then bought at from 10*l.* to 15*l.* each, which are now, by their scarcity, from 25*l.* to 35*l.*; and those for the coach, that is, the light active half-blood horses, are from 40*l.* to 60*l.*

And another evil occasioned by this law is, that such farmers are obliged to keep horses of the largest size, which consume the produce of much land, by eating a large quantity of corn, when the smaller horses, working easy, seldom eat any. It is conceived by the same writer, that upon this principle, a law for regulating roads may be enacted, so as to answer every good design of the present, and at the

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same time relieve those individuals who are exceedingly injured, and also be of general utility.

It is likewise remarked in regard to private roads, that they are by no means properly attended to; and which may be attributed to the general highway act being so easy of evasion, that every farmer is able to avoid doing statute duty, or at least next to none. Nothing is more valuable than time, especially to a man of business; and a farmer who executes the office of surveyor of the highway, *impartially and effectually*, will find he must neglect no small part of his own business; and after all he might, perhaps, have been as little out of pocket had he done the whole work with his own team and labourers. It is stated, that there is no trick, evasion, or idleness, that shall be deemed too mean to avoid working on the road; sometimes the worst horses are sent, at others a broken cart, and a boy, or an old man paid labour, to fill; they are sometimes sent an hour or two too late in the morning, or they leave off much sooner than the proper time, unless the surveyor watch the whole day. It is true, that redress may be had by application to a magistrate; but then how often causes of complaint occur; and how many days must be lost to bring each home to the offender; who, *from custom*, thinks he is doing no harm; besides the constant breach of good neighbourhood that must be occasioned by these petty litigations. It is suggested that a remedy might easily be had in the following manner. Abolish all personal service upon the highways. Let surveyors be appointed, as at present, who should have power, under the authority of two magistrates, to raise, by rate, certain sums that may be necessary for the repair of the roads within the respective parishes and townships, and to account for the same at going out of office at the year's end. The farmer, who acts as surveyor, might then be able to repair the highways when most convenient to himself, and when he could give attention to them without any interruption or impediment, whereas at present some duty is given up, or nearly so, from the difficulties arising in collecting it. On the same principles, the author of the Present State of Husbandry in Great Britain contends, that an act of parliament should be introduced, for the purpose of rescinding the ancient laws respecting statute labour; which have in every instance been found ineffectual, and to establish other general rules and regulations more likely to answer the purpose in the new improved state of the country. He adds, that the existing acts of parliament respecting the making and repairing roads, where the justices of the peace cannot commute the statute labour, are not sufficient for the purpose of raising a fund sufficient for keeping the roads in repair. Where the justices of peace have it in their power to assess the inhabitants in a sum of money in lieu of the statute labour, it is in general not the want of means, but the misapplication of that means, or negligence in the general management, that is the cause why the parish roads are almost every where a disgrace to the country. The imperfect and indifferent modes of executing the statute work, as stated above, render it necessary, it is supposed, that those statutes enforcing the performance of this necessary duty should therefore be abolished; and in every county the justices of the peace ought to be invested with the power to assess the inhabitants of the district by some equitable *ratio*, whereby they would pay only in proportion to the benefit they received. Were this generally done, as is the case in several parts of Scotland, the counties divided into districts of such size, that the proprietors could conveniently meet as occasion required; the money arising from the commutation act collected by one person, who should be allowed a certain *per*

centage on the sum collected, be continued during good behaviour, and be responsible for his conduct to the gentlemen of the district; the money so collected be afterwards expended under the direction of these gentlemen, and the whole be subject to the review of the quarter-sessions; the parish roads would, it is supposed, soon be materially improved. If to these regulations a power were added to mortgage the sum arising from the commutation of the statute labour for such a number of years, and to such an extent, as was found necessary to put the useful private roads in a perfect state of repair, they might, it is supposed, in a few years, be made the reverse of what they are at present. The last measure would be found the most effectual of any that could be adopted, and is probably the only one that can be resorted to for the purpose of effecting an immediate and general improvement.

It has likewise been remarked by the author of the "Landed Property of England," in respect to the improvement of farm-lands by these means, that the art of planning, forming, and repairing roads, is a subject with which, for various reasons, every manager of a large estate ought to be familiarly conversant. It is not enough for him to know the theory, or general principles, of the art. It is necessary that he should study it practically in the particular district in which he is placed; and with the given materials that it happens to afford; as by these means he can only be capable of executing the business with the greatest possible advantage. In this business a most material point, whether in the *laying* out of *new* roads, or *improving* such as have been long established, is that of giving them all the advantage in direction and other circumstances that the peculiarity of their nature and situation admit of. It has been stated by the above writer, that most of all the old roads of the kingdom (the remains of the Roman ways excepted) owe their present lines to fortuitous circumstances. Many of them were, no doubt, he thinks, originally foot-paths; some of them, perhaps, the tracks of the aboriginal inhabitants, the patriarchal savages, who lived by hunting; or of the pastoral tribes, who travelled with their flocks and herds from pasture to pasture, as herbage and browse invited; or of the first settlers, between bidding places which may not now exist. And that these incidental foot-tracks, especially when they led through woods, became, as the condition of society advanced, the most convenient horse-paths; as we not unfrequently find at the present day. Consequently, that in this state of society, before wheel-carriages were in use, many of the lands of the kingdom were appropriated, by which circumstance those fortuitous lines of roads became fixed and unalterable; there being no other legal lines left for carriage roads, than those incidental horse-ways, or small tracks. He supposes, that in this account of the probable origin of roads, we have, at least in part, the cause of the crookedness, as well as the steepness, of carriage roads, between the places which are now inhabited: for true it is, that the traveller is not unfrequently led down one steep to make an angle, and ascend another; while the hang of the hill would conduct him nearly on a level, and by a more direct line. But, admitting that a cluster of habitations heretofore stood at the angle, the seeming absurdity ceases. He adds, that formerly, it is probable, the zigzag direction of roads, between towns and villages, was much more observable than at present. In more modern times, and since the legislature wisely interfered with respect to appropriated lands, many improvements of lines have been made. And, by the general laws which have more recently been passed, magistrates are invested with authority to alter established lines. So that

that now, the expence of alteration may be said to be the only obstacle, in ordinary cases, to the perfection of the lines of roads in this country. And which is, of course, a circumstance that has had much effect in improving the convenience of travelling.

And it is suggested, in respect to the direction of roads, that the most perfect line is that which is straight and level. But this is to be drawn in a country only which is perfectly flat, and where no obstructions lie in the way:—joint circumstances that rarely happen. Where the face of the country, between two points or places to be connected by a road, is nearly but not quite level, by reason of gentle swells that rise between them, a straight line may be perfect;—may be the most eligible under these circumstances. But where the intervening country is broken into hill and dale, or if one ridge of hill only intervenes, a straight line of carriage road is seldom compatible with perfection. And that in this case, which is nearly general, the best skill of the surveyor lies in tracing the midway between the straight and the level line. Here the level line of perfection, for agricultural purposes, is to be calculated, by the *time* and *exertion* jointly considered, which are required to convey a given burden with a given power of draft from station to station. On great public roads, where *expedition* is a principal object, time alone may be taken as a good criterion. It is likewise added, that the most regular method of finding out the true line of road, between two stations, where a blank is given,—where there is no other obstruction than what the surface of the ground to be got over presents,—is to ascertain and mark, at proper distances, the *straight line*; which is the only certain guide to the surveyor. And that where the straight line is found to be ineligible, each mark becomes a rallying point, in searching on either side of it for a better. If two lines of equal facility, and nearly of equal distance from the straight lines, present themselves, accurate measurements are to determine the choice. If one of the two best lines, which the intervening country affords, is found to be easier, the other shorter, the ascent and the distance are to be jointly considered, the exertion and the time required are likewise to be duly weighed. Further, also, the nature of the ground, the source of materials and, generally, the comparative *expence* of forming the road by two doubtful lines, as well as their comparative *exposure*, are to be taken into consideration. A long line of road, across a broken country, should not be hastily drawn or determined upon by the directors of this sort of business.

But in regard to the most difficult and troublesome part of this sort of work,—the necessary management in the ascent of hills,—it is observed that, whether in laying out a fresh line, or in altering an established one, modern road surveyors, like many other reformers, have run from one extreme to another. To do away the absurdity of going up one steep and down another, to ascend a third in order to reach the required elevation (a common occurrence on fortuitous roads), they have ingeniously, but very injudiciously, given an uniform rise from the bottom to the top of the ascent. In the theory of mechanics, and where mechanic powers only were to be used, a regularly inclining plane would be perfectly proper, in a case of this kind. Where the requisite power is to be applied by rational beings, the same principle, though not altogether perfect, may be allowed; but when the moving power is neither purely mechanical, nor in a sufficient degree rational, but an irregular compound of these two qualities, the nature and habits of this power require, he thinks, to be consulted. It is, he conceives, one of many instances, which shew the impropriety of applying purely mechanical principles, in agricul-

ture and rural concerns, in which they are to be combined, not only with the power but the will of the animals. No man who has been accustomed to drive a road team, or in the habit of seeing one driven in a hilly country, and who properly regards what he sees, would lay out a long line of ascent without one or more breaks, or convenient resting-places; in which the animals of draft may relax at their ease, and set off again without difficulty. He, however, observes, theory will readily suggest that, by a drag-staff, or pall, a carriage may be securely stopped on the steepest ascent. But practice well knows the danger of checking the efforts of beasts of draft while they are struggling against the collar. For if they possess any habits, or even the seeds of restiveness, nothing is, he contends, more likely to encourage, or produce it, than suffering them to stop under the difficulties of draft. Besides, those which are true to their work, well knowing the extraordinary difficulty to be overcome, in putting a carriage at rest into motion in such a situation, stop under a degree of anxiety; while the more spirited and irritable stand on the rack, and tremble at the apprehension of the painful effort they have to make. But let them see an end, or a respite, of their endeavours, and they will struggle with willingness. A rest, after the difficulty is surmounted, comes as a reward for their exertions. But where the natural surface of the ground is well studied in any given case, there will seldom, he supposes, be much difficulty in assigning the places proper for rests; so as to make the road not only easier for carriages of burden, but safer and more pleasant to travellers, as well as more tightly: besides being better to be kept in repair, than an uniform descent; by reason of the flatter stages being checks to the surface water, and convenient places to get rid of it, without injury to the face of the road. But where such breaks do not occur, the line of ascent should be uniform; or as nearly so as the natural surface, or immoveable obstructions of the acclivity to be surmounted, will allow in the particular case.

Likewise in the setting out of these lines, the common level is to be set by an observation from the bottom to the top of the ascent (these points having been previously determined on, by the given circumstances of the general line of the road), or from station to station where a clear view cannot be had between the extremities; and the degree of ascent, thus ascertained, is to be marked with a pencil upon the instrument that is made use of for the purpose. And by this mark it is advised to trace a rough line along the face of the hill; in order to determine, with sufficient truth, respecting the proper breaks, or resting-places, that may be required; endeavouring to fix upon such natural breaks in the slope as are situated in, or sufficiently near, the general line of ascent. And that when this has been done, to ascertain, by similar observations, the exact angle of elevation, or degree of steepness of each rise, or length of ascent between the breaks, &c. by these means procuring an unerring guide, in marking out and forming the base or bed of the road; without the risk of incurring unnecessary labour and expence in doing the work twice over to bring it to the truth, or a state of suitable exactness.

But it is well remarked by Mr. Marshall, that the best services of the road surveyor lie in avoiding, not in surmounting hills. And that in a long line of road, between places of nearly equal elevation, this may often be done. There are instances of the most public roads going over the tops of hills, where lines of equal length might be traced along their bases; and the difficulty and danger of ascending and descending the steeps be avoided by such means.

Very much attention has lately been bestowed on this de-

partment of the road-maker's business, especially in the more northern parts of the kingdom; but much is still left to be accomplished, especially in the western districts of the southern parts of the island, where an attachment still remains to the original lines or directions.

And it is suggested by Mr. Beatson in the paper above alluded to, that the business of laying out the lines of roads may, in fact, be reduced to three simple principles; those of fixing upon the *shortest*, the *most level*, and the *cheapest* directions, for which, though apparently very easy of execution, from the frequent occurrence of circumstances that render it necessary to deviate from them, the knowledge and experience of the surveyor are found requisite. The first requisite from its being a straight line, is often necessary to be departed from in order to avoid the removal of expensive obstacles, such as hills, rocks, water, and morasses. The second is of vast importance, and should invariably be adhered to, if possible, even though the other two should, in a certain degree, be given up; for it is infinitely better to go a considerable way about to obtain a level road, than to go straight forward and be obliged to take an ascent; but it may, in some cases, be preferable to ascend a gentle rise, in order to obtain a good hard bottom, and a road easily made, than to go on a level through a swamp, or piece of water, which would require a much greater quantity of materials, be much more difficult to keep in repair, and occasion a great deal more expence. It is not the most hilly line to appearance that is always to be rejected as being the least level; for the steeper and shorter some hills are, it will be the easier to obtain a level road in that direction, by cutting down the summits, and laying the materials taken from them in the vallies or hollow parts, which, in many instances, may be done with great facility. And the third, or the least expensive line, is also frequently given up, in order to obtain one or both of the other two. It is therefore concluded, that much depends on the skill and ability of the surveyor, who, before he finally determines on a line of road, ought to make himself perfectly master of every part of the intermediate and adjacent country; nor should he rashly determine at once, but should examine repeatedly, over and over again, whether no other line would be better than that he first thought of.

And with respect to the parts or divisions of which a public road should consist, it is obvious that they should vary in some measure, according to the nature of the traffic or business which is carried on upon them, the situation in which they are placed, and the particular circumstances of the different cases. It is, however, contended by the author of the "Landed Property of England," that the plan and formation of all *public* roads should be the same; every public lane, or other scite of a public road, he conceives, ought, where the width and other circumstances will permit, to be divided into three travelling lines, namely: 1. A middle road of hard materials, for carriages and horses, in winter and wet seasons: 2. A soft road, formed with the natural materials of the scite, to be used in dry weather, to save the unnecessary wear of the hard road, and to favour the feet of travelling animals; as well as for the safety, ease, and pleasantness of travelling in the summer season: and 3. A commodious path, for the use of foot passengers, at all seasons. But in these cases, he thinks, modern practice has simplified too much. Instead of these three requisites of a public road, we generally find a parliamentary or turnpike road (away from the environs of great towns), consisting, simply, of one uniform broadway of hard materials; upon which horses stumble, and carriages jolt, the year round: while travellers on foot are seen wading to their ankles in

mud, or in dust, according to the state of the wind and weather. His notion of what the nature of a public road ought to be, is, that within the fences of a lane or road there should be a raised foot-path, a convex hard road, a soft summer road, and channels to carry off the water collected by the carriage roads; the foot-path being cut across, in proper places, to permit the water, which falls on that side of the middle road, to pass off freely into the ditch at that side, as well as to prevent horsemen from riding along the path; the opposite hedge-bank being perforated, to let off, into the other drain on the contrary side, the waters which may collect on that side of the lane or road.

And in regard to *private* roads it is contended, that where they are much used, as in such as lead from a village or other place to a public road, they should have a double carriage path, so that carriages may any where pass each other. But that for such as lead merely to a farm-house or a hamlet, a single line sufficiently wide to let a single or saddle horse pass a carriage with occasional dilations for carriages to pass in, are only in general requisite.

Form of Roads.—Further, in regard to the most appropriate form of roads, there has been a great difference of opinion among the persons engaged in this sort of work, some contending in favour of the *convex* form, while others are inclined to think the *concave* shape preferable in many cases; and still others, that they should be either made perfectly flat from one side to the other, with inclined planes longitudinally, or be *wholly flat* in every direction. But experience fully shews, that some degree of the convex form is necessary in almost every case, in order that the wetness and moisture may be discharged with greater facility, and of course the roads be preserved in a more dry state. And in speaking of this form of road, Mr. Beatson observes, that the rise in the middle is more or less according to the fancy or whim of the makers, but in general it is a great deal too much. This form is adopted on the idea, that whatever wet falls upon the road will run off towards the sides into drains made there for the purpose of receiving it. If the roads were a perfect smooth hard surface, this theory would, no doubt, he thinks, hold good; but in practice it is found not to be the case, for the wheels of carriages occasion so many ruts, and such a roughness on the surface of the roads in general, that little or no water can run towards the side-drains, however convex the road may be. It consequently lodges in those ruts, and every succeeding carriage, he thinks, the more easily makes them deeper, and works the water and materials together in such a manner, as very soon to render the road extremely disagreeable. This frequently happens, he asserts, even on roads that have been made most inconveniently convex, for the very purpose of keeping them dry; consequently, the convexity of a road has not the desired effect of preventing water lodging upon the surface. Besides, it is, he conceives, extremely inconvenient for all wheel carriages, and destructive to the road itself, by making the loading rest unequally upon the wheels, unless when going on the very middle of the road, for the lowest wheel will always bear the greatest part of the burden, and therefore will injure the road the more in proportion. If a cart or any carriage with two wheels is loaded, we will suppose, with two tons weight; when that cart is upon a level from side to side, the load is equally divided, and each wheel sustains the weight of one ton; but if that cart is going on the side of a convex road, there will perhaps be the weight of a ton and a half upon one wheel, and only half a ton upon the other, consequently the lower wheel, in this case, will do the road as much injury, as if the cart were loaded with

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with three tons upon a level, instead of two upon such a declivity. The proportion of weight upon each wheel, according to the declivity, will depend on the nature of the loading of the cart, for the higher the centre of gravity of the load is, the greater will that weight be on the lower wheel on the same declivity; and therefore a cart loaded with hay, straw, or wool, or any other bulky commodity, will be more injurious to a convex road, unless when on the middle of it, than the same cart loaded with the same weight of stone, lead, or iron, or any other weighty commodity which lies low in a cart: and nothing can be more injurious on such roads, than a stage-coach loaded with outside passengers. But the destructive consequences of allowing carriages to heel much on any sort of road are even visible, though in a small degree, he supposes, from the effect produced by a wheel going over a stone, or any hard substance lying in one of the tracks or ruts, in which case there will soon be a deep hole formed by the wheel in the other track, directly opposite to that stone or substance which raised the other wheel. Every precaution ought, therefore, to be used to prevent carriages heeling to one side on any part of a road. And he suggests, that the inconvenience, and in many cases the danger, of going on either side of a convex road, makes all waggoners, carters, coachmen, &c. keep always on the middle, by which, on such roads, there is seldom any other part used by wheel carriages, however wide the road may be; consequently, by the carriages being always confined to the same track, that part of the road soon gets out of repair, and requires a constant outlay of money to keep it in proper order or condition for being travelled upon. It is also added, that the method of forming and making the convex roads, in the first instance, appears to him very absurd. He supposes, that before any hard materials are laid on, the road is generally formed in somewhat a hollow manner, rounded below, in which there are drains, or ditches, on each side: also the footways or horse roads when made high enough. These are also sometimes called the summer roads, on account, he supposes, of that being the only season they can in general be travelled upon. The road forms a convex line, about ten or twelve inches lower at the sides of it than the footway and summer road. After being thus formed and prepared, the hard materials, mostly consisting of broken stones, are laid on, which, it is supposed, will fill up that space which is the hollow in a convex line, and when finished, the whole surface, from one side to the other, forms one convexity; the footways or horse roads being made a continuation of the same curve. And this is still with the idea, that all the water that falls on the road will run into the drains on each side. But let any person, in wet weather, take a view of a road thus formed, and he will find, that, in general, however great the convexity may be, the water will stand in every rut and every impression made upon it, especially if the road has been long travelled upon; that the stones on the surface are pulverized by heavy wheel carriages, and the wet earth from below worked up among them. Also where the road is but newly made or repaired, and the materials are sufficiently porous to let through the water, it will then lodge on the convex surface, in every impression of a stone or other uneven part, particularly at the sides, where it is dammed again by the footways, and thus the bed or foundation of the road is kept constantly moist, and of course it will very soon go out of repair. By this continual moisture the stones sink down into the soft earth, of which the bed of the road is composed, and this earth works up through the harder materials, and occasions all that dirtiness generally on the surface of roads in wet weather, although, perhaps, ten or twelve inches in thickness of those hard materials had

been at first laid over it. Sometimes, indeed, there are under-drains made through the footway, from the side parts, at every ten or fifteen yards distance, to convey the water into the ditches; but even this is not found to answer the purpose intended, for the intermediate spaces soon become so impervious, that the water does not pass through them to enter these drains, the wet earth being converted into a sort of puddle, resembling what is used, in aquatic works, for the purpose of preventing the moisture from penetrating through, and consequently it lodges in all the ruts and hollows on the surface, without passing off so quickly as should always be the case in such instances.

Besides this there is another manner of forming these convex roads advised in the Bedfordshire Agricultural Report, in which it is proposed to leave a hollow or vacuum, as it is called, in the middle, to deposit the hard materials in. The only difference that appears to be between this and the method described above, is, that instead of the bottom of this hollow being made convex, it is made flat, and also deeper. It is thought that this method is liable to the same objection as the former, perhaps even in a stronger degree; besides, it would require a much greater thickness of hard materials, which are very expensive, and those materials would be deepest or thickest in the middle of the road, where the wheels of carriages hardly ever go, consequently that part is not so liable to be cut up as the tracks in which wheels most generally run, and produce their greatest effects. Mr. Marshall seems, however, to think more favourably of this form of road, especially for wet weather, assuming it as a sound position, that roads, in general, which are intended to be travelled in wet seasons, should be *convex* or *sloping*, not flat or concave. It remains to determine the proper degree of convexity of the hard line of road; from the margin of which the dry-weather line ought to shelve gently to the foot of the hedge-bank; so that carriages may pass freely, and safely, from one line to the other; and in order that the rain-water which falls on that side of the lane may find its way, easily, into the channel prepared for it, which is, he conceives, for a wet-weather road, to be regulated by a variety of circumstances: as, first, by the materials of which it is to be formed: soft materials are most liable to be worn into ruts and hollows, and require to be laid up with a quicker descent for rain water, than hard materials, which require less elevation or rotundity of surface; and least of all a firm even pavement. Secondly, that a convex road in the face of a steep is to be laid up higher, with a given material, than one on more level ground, on which rain-water has no other tendency than to the sides; whereas in the face of a steep, it may have an equal or greater tendency along the line of road; and is liable to be caught by the slightest impressions of wheels; and thus to wear channels, as may too often be seen, from the top to the bottom of the hill. Even where the surface of the road is perfectly smooth, it may have twice the distance to run, before it reach the outer margin, that it has on a level. And thirdly, that the degree of convexity is to be determined, in part, by the width of the road; the materials and descent being equal. A wide road requires to be formed with greater sideway descent than a narrower one; which more readily frees itself from rain-water, inasmuch as the distance is shorter from the crown to the outskirts of the road in such instances.

But that the freeing of a road from rain-water is not the only object to be kept in view, with regard to its convexity: the ease and safety of carriages, and particularly those of burden, whose loads, being of light materials, are laid up high, require to be consulted. A carriage moves most freely, and with the least exertion of draft, when the load

lies evenly upon the wheels on either side. In proportion as the weight is thrown on one side or the other, the resistance is increased; especially on the road which is liable to impression. Hence the inconvenience of a highly convex road in the face of a steep; and hence the utility of breaks in long ascents, or such roads as are formed in hilly situations.

In fact, he conceives it evident in respect to convexity, that every part of a road should be equally and duly convex,—should be equally safe and easy for carriages of every description; otherwise it becomes partially worn; the more level parts only are used; the steeper being in a degree useless. Hence a road of even and due convexity is not only easy and safe, but may be formed of a narrower width, than one whose steep sides are neither easy nor safe to be travelled; and whose crown, only, is in use for passing upon. And on measuring different passages of roads which appeared to lie in the most desirable form, and taking their convexity, or the elevation of the crown or middle of the road above the base line, he has found that roads of twenty feet in width rise about ten inches: namely, one inch in every foot, on either side. And he is of opinion that this result may be taken as a general guide in forming roads: this middle degree of convexity being liable to be altered according to the width of the road, the nature of the materials, and other circumstances which have been stated already.

And concerning the second or concave form of roads, Mr. Beaton thinks that it is quite the reverse of the common form, being lowest in the middle, where other roads are generally made highest. By differing so widely from the common practice, and the general opinion of road makers, one would at first be almost inclined to suppose, that so singular a practice in forming roads could only proceed from a desire or propensity to differ from the rest of mankind: but when we are told that the late celebrated and ingenious Mr. Bakewell was an advocate for this form; that the road by his farm of Dishly, and that through Mesham, in the same county, are both upon this principle, and in much better order than the roads found about them; likewise that the road through Bredon, made under the direction of Mr. Wilkes, is of the same form, and is said to be better now than ever remembered before, and kept in order at much less expence:—when we consider these well authenticated facts, supported by such respectable evidence, we naturally conclude that the reasons for adopting this uncommon form of road, are founded on something more substantial than mere whim and caprice; and consequently deserve to be more fully investigated. This writer states, that he has not been able to learn the manner of forming these kinds of roads before the hard materials are laid on, but, when completed, he understands the form is something similar to that of a paved street, with a drain for the water in the middle. The whole width of the road is divided into three equal parts, or nearly so. The sides are made quite flat. The middle division has a gradual but small descent, or concavity, from each side to the middle part, which is the middle of the road. This concavity has also a small descent lengthways, made on purpose, if not declining naturally, sufficient to carry off the water to proper outlets. In the middle division the best and hardest materials are laid. The direction of Mr. Wilkes, as stated in an ingenious paper, in the first volume of Communications to the Board of Agriculture, is, that when the fall is one foot in 150 or 200 feet forward, the fall from the sides towards the middle ought to be 15 inches in 20 feet. When one foot in 100 to 150, to be 12 inches. One foot in 30 or less, to be even the whole breadth.

Where the width of a road is 60 feet, one foot of fall to each 40 feet in length of the road. Twenty feet from the sides towards the middle, to have nine inches of fall.

The inner 20 feet to be flat.

And Mr. Bakewell's idea, he is informed, was, that water, where it can conveniently be applied, should frequently be let run upon this concave part, in order to wash it quite clean; for it is always observed, where a small stream of water comes upon a road, that part, if the bottom is good, is generally firmest, and hardly ever gives way. To have a command of water, therefore, to flood the road at pleasure, he thought would be of great advantage in keeping it in order. And the other useful properties attending a road of this form are the following: There are three parts of it on which wheel carriages may go, without heeling to either side; on the side divisions, and also on the middle division, when the horses walk in the lowest part. This is certainly a material advantage, being much more easy for the horses and less injurious to the road. By carriages using indiscriminately these three tracks, all parts of the road will wear more equally and for a greater length of time; whereas in the convex roads, there being only one part, namely, the middle, on which carriages can go without heeling, that part only is most generally used, and consequently soonest gets out of repair, which is a great inconvenience in such roads.

With respect to flat roads sloping longitudinally, the advocates for them observe with good reason, that by being flat or level from side to side, the pressure of wheel carriages will be more equal, the friction less, and all parts of the road may be travelled on with the same facility; consequently it will wear more equally, be easier kept in repair, and require fewer materials for keeping it up. But notwithstanding such advantages are deserving of attention, it must seem to those unaccustomed to such a form of road, a difficult matter to keep it sufficiently dry, or free from the stagnation of water upon it. But from its having been observed that the ruts made by the wheels of carriages prevent the water running to the sides of convex roads, it is proposed that roads of this form should have in every level part gentle slopes, sufficient for water to run along, which, supposing them to be one foot in fifty, would hardly be perceptible. On these slopes, or inclined planes, the ruts made by the wheels of carriages would promote the water running off, by forming so many little channels or conductors for it to run into the lower part of these slopes, from whence it must be properly conveyed away. By this plan such roads will be much more easily kept dry than the common roads usually are or can be from the nature of their construction.

And farther, in regard to the wholly flat form of roads, the reasons given for them are nearly the same as stated in support of the last, only that as there are few parts of a country so perfectly level, for any considerable distance, that water will not run either one way or another, it is consequently unnecessary to be at the expence and trouble of forming those slopes or inclined planes recommended in the preceding form; but that proper outlets should always be kept clear at every hollow part, and if the road should in any place be quite level, a shallow cross drain, that will occasion no impediment to carriages at every 50 or 60 yards distance, or nearer, will keep the road sufficiently dry.

And it is from these statements concluded by Mr. Beaton, that the main objects sought after are, 1. To keep the road always as free from moisture as possible: and 2. To construct it in such a manner, as to render the draft or communication easiest, at the least expence. In these are

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comprehended all the requisites necessary to form a complete road. To attain them in the best manner is therefore the important point. Four different methods have been stated, each of which has its supporters. The arguments in favour of each have also been shortly mentioned, which will shew that their main object is the same, unless perhaps the idea of watering the concave road may be considered a deviation from one part of the general rule: but as that is proposed to be done only to wash the road occasionally, in case it becomes dirty or slushy, it cannot therefore be considered in that light in any respect whatever. But from these modes of constructing roads being in some measure unsatisfactory, he is induced to offer a new theory on the subject, which is founded on the knowledge of the stratified nature of the earth. It is however only given as theory, having never, he believes, been subjected to the test of actual practice. It is observed, that every person who has paid the least attention to the structure and formation of the different strata of the earth, must have seen that some of these strata are of so close a texture as to be impenetrable to moisture; others again are so porous, that water will easily run through them in any direction, till it meets with some obstacle, or finds a vent. Of the first sort some are less dense, and of the latter some less porous than others, consequently as they partake more or less of these qualities, the water or moisture will the more or less quickly penetrate through them. But in order to shew this more clearly, and apply the principle to the construction of roads, he supposes the section of a hill or eminence composed of a number of strata. If the upper stratum or surface soil is of a porous nature, it is evident that any water which falls upon it, will penetrate through to the stratum below, where, if it cannot go farther, it will glide along the surface till it finds a vent at the bottom of the hill; if the second stratum is hollow, and continues on towards any depression in it, the water will lodge in that hollow, and form a sort of pool or bog, as is sometimes observed on the tops of hills; but if in this hollow place there is a communication with the porous stratum, no water will lodge there, but it will penetrate through and glide along the upper part of the dense stratum below, till it finds a vent on the side or at the bottom of the hill, as before. And by the above it will also appear, that if the uppermost stratum is of a close texture or clay, any water falling upon it will not only lodge in the large hollow, but in the smaller ones, and in all the other irregularities or concavities that may happen to be upon the surface. Hence, also, it is evident that in order to keep dry the surface of any such piece of ground, it matters not of what shape or form that surface is, or whether it is convex or flat, provided there is a communication with some under stratum, sufficiently porous to carry off the water below; but it is of some consequence the form of the upper part of that stratum upon which the water is to run, for the smoother it is, the water will of course the more easily flow away, and be discharged from it.

It is easy, it is supposed, to apply these principles in the forming of roads in the following way: when a new road is to be formed, let it be done in the first instance nearly in the usual manner, with such materials as are on the spot, and the nearer the quality of these approaches to *clay*, so much the better. Instead, however, of forming it convex, as is generally done, let the lines on either side from the middle be quite straight, and meet in an angle or ridge at that part or the middle of the road, having a slope from thence to each side, of about an inch in a foot. There are to be made small drains for the more easily conducting away the water that may be collected at those places. The road, being thus

formed, must be allowed to harden and settle for some time before any other materials are laid on, great care being taken, while in that state, to let no carriages or cattle upon it, and it should be rolled with a long wooden roller, that will reach at once from each of the sides to the middle. This roller should be loaded with a box of stones to make it sufficiently heavy, and that it may be the more portable when that box is taken off; and it may be so contrived, that by changing the horses from one side to the other, there will be no occasion to turn the roller, in order to make it roll the same space over again. Being rolled in this manner, will consolidate the materials composing the ridge of road, and prepare it for receiving those to come afterwards, for it is a most absurd practice to lay hard materials in the common way upon this first form or basis of a road, before it is sufficiently firm to bear them. When thus formed and properly settled, the next step to be taken is to imitate the works of nature in dry soils as nearly as possible, by forming a stratum penetrable by water, composed either of sand or sandy gravel, or any other substance easiest to be got, that is sufficiently porous to admit water to pass through it. This stratum should be laid quite level, and extending from one side of the road to the other, filling up the small drains also on the sides. Over this are to be laid the best materials that can be got for completing the road, consisting either of stones broken very small, or of the best gravel. This coat of hard materials need not exceed above six or seven inches in thickness, which being much less than is commonly used, will be a considerable saving; and it may even still be less, if the directions hereafter given are strictly attended to. If this covering consists of broken stones, they should afterwards be laid over with sand or fine gravel, when easily procured, so as to fill up all the cavities betwixt them. The sand or rubbish from a freestone quarry is excellent for this purpose, providing there is no mixture of earth in it, which should be carefully guarded against in every step taken after the road is first formed. These finishing materials being properly laid on and smoothed with a rake, the whole should now, before any carriages or horses are admitted upon it, be well rolled with a heavy iron roller, divided in three parts for the purpose, the two hind divisions of the roller being large, the front or middle division smaller, to the framing of which the shafts are fixed, and so contrived, that it turns in the manner of the fore-wheels of a waggon; there is a box for holding stones to increase the weight when necessary; but in adding this weight, it must be observed to lay about two-thirds of it over the two large parts, and only one-third over the other, otherwise the pressure will not be equal. Iron rollers are sometimes made in three parts, as above, but being all in a line, and close together, they are apt to be clogged by gravel and small stones, which cannot happen in the construction here recommended. It is contended, that if such a roller were generally used upon roads, especially when newly made, it would save a great deal of expence in repairing them; for it cannot be expected that any new road will immediately bear wheel-carriages, or continue long in repair, when composed entirely of loose materials, without the smallest pains being taken to consolidate them together. Frequent and heavy rolling would therefore produce the most beneficial effects, and would tend very much to keep the road free from deep ruts and holes; besides, there is nothing could contribute more effectually to promote and preserve firmness and solidity, two qualities without which it is impossible any road can, with propriety, be called a good one, or have the necessary degree of solidity and firmness.

The advantages that would result from this mode of construction

struction would be various : by being level on the surface, every part of it is equally commodious for carriages, consequently it will all be equally travelled upon, and the deep ruts so frequent in other roads, will almost entirely be prevented. It will therefore be much easier kept in repair, and, if properly managed at first, will be made at less expence than the common roads, especially in a sandy soil, or where sand or gravel is easily procured. The draft will be much easier on such a road. And one very important advantage is, by having an under-stratum through which the water can penetrate, and the cavities among the harder materials being filled with the same porous substance, no water can ever lodge on the surface, nor can it ever become so dirty as other roads are in wet weather ; all the water that falls on the surface, unless perhaps in very heavy rains, being conducted away underneath and in every part. And it may be added, that from the small drains on each side of the road, cross-drains should be carried through the fences, provided the level of the ground will admit of it, at the distance of every ten or fifteen yards. These cross-drains may be made of wood, with about an inch bore, or of stone, if preferred.

It would be of great advantage to this sort of road, as well as to every other road where the ground is inclosed on each side, that the fences should be sunk towards the fields, and the water be conducted through to these sunk fences, instead of the common method of leaving large open ditches and drains on each side of the road. It must also be particularly attended to, that on all sloping roads on a declivity, where the water is apt in heavy rains to run upon the surface, or at the sides, that it ought never to be allowed to run in the same direction more than ten or fifteen yards, but at that distance to be conducted away to a side into the main drains. It will then do little or no harm, as it can never increase beyond a very weak stream ; but if it is allowed to run one hundred or two hundred yards, it will probably be increased to such a size before it reaches the bottom, that it will wash away a great deal of the materials, and may besides very much injure the road or fences on each side of it, which would be highly disadvantageous in many respects. Besides, it is suggested, that a road formed on this plan need not be quite so wide as roads in general are made, for the whole surface of it will be in use from one side to the other, and therefore from twenty to twenty-four feet wide is quite sufficient, unless near populous towns or extensive works, where great numbers of carts or waggons are employed. And in the interior parts of the country, twenty feet in width will answer every purpose required. He has observed in several places, where the roads have not been above eighteen or twenty feet wide, and properly made from side to side, that they were in much better condition than the neighbouring roads, from thirty to forty or fifty feet wide. On these wide roads, formed in the usual way, there is seldom more than eight or ten feet in the middle of them generally made use of ; the remainder one on each side being occupied by heaps of stones, scrapings, and other rubbish, which, although they may partly be of use sometimes in repairing the roads, ought on no pretence to be allowed at all times, or at any time, to lie there ; such rubbish being not only disgraceful on the sides of a public highway, but even dangerous, particularly in the dark, for either carriages or horses ; besides having various other disadvantages arising from the growth of weeds, and the dissemination of their seeds.

But in respect to the most proper and best form of the roadway of narrow lanes, as those leading from village to village, in reclusive situations ; where bridle roads, or packways, have been so far opened as to admit carriages ; or

though the whole width of the lane may not be more than eight or ten feet, it is remarked by the author of the treatise on "Landed Property," that on such a narrow space, a whole barrel, or convex road, cannot easily be kept up. If raised, it presently wears into a middle track, and two wheel-ruts, with foul drains on either side of them ; and becomes, in wet weather, a dirty trough, which is unfit for either carriages or horses, and in which a foot passenger has not where to set his foot. But that provided such a lane be thrown into a shelving form, resembling half a barrelled or convex road, a greater width of travelling road for carriages and horses will be obtained ; ruts will not be so liable to be formed ; the whole of the water of rains will be thrown on one side ; while the other will afford a comfortable walking path at all seasons. And this, it is added, is now no longer merely a probable, but a tried improvement. Lanes, ten, twelve, or more feet wide, have been strikingly improved by it. And it is further suggested, that when water, in a wet season, is apt to ooze out of the banks on the upper side of the lane, a narrow channel is to be cut, to prevent its overflowing the road : or, in forming the bed of the road, the inclination may in some cases be reversed ; so as to throw the drain on that side of the lane from whence the spring water issues : thus the same drain will serve for the spring and the rain-waters. And it is added, in regard to this semi-convex form of road, that it is applicable, not only to narrow lanes, but to the sides of hills ; where the road, as it generally ought, is conducted fiddelong, not directly, up the slope. By this form of the road, the whole of the water which falls upon it will be got rid of, without inconveniency or expence. And the bed of the road, for this purpose, may be made narrower than for a full convex road ; a circumstance which, in some cases, may become a saving of much expence. The upper side of a road in this form being nearly level, and firm to the foot of the steep, would be chosen by ascending carriages ; while the lower side would acquire a looseness of surface, and be used by laden carriages going downward ; and while a raised foot-path, on the lower margin, would be a secure guard, and a relief to the apprehensions of timorous travellers.

But in relation to the width of public roads where a blank is given, it should be regulated, Mr. Marshall says, by their publicity, as it is compound folly to make a road wider than its use demands. He supposes that there are few roads, even near populous towns, that require a greater width than about thirty-three feet. But every public road, under common circumstances, should have a line which is travelable at any season, and of ample width to permit two carriages to pass each other with freedom and safety. This ample width let us set down as one statute pole. In deep clayey districts, where hard materials are difficult to be procured, a single road, of half a pole in breadth, with dilations at proper distances, to let carriages pass each other, may, in many reclusive situations, be advisable. This regards the breadth of the winter road, for carriages and animals of burden. But that the width of a public lane requires a more enlarged view. On the plan offered, it is to contain, not only a wet-weather road, for carriages and horses ; but a summer road, and driftway ; as well as a foot-path, which may be used in any season. He observes, that in many parts of the greatest public roads across the kingdom, the lane is not more than twenty feet wide. But this being filled with hard materials, from hedge-bank to hedge-bank, carriages alone seldom find any inconveniency in these narrow parts. But where carriages, and large droves of cattle or sheep meet in them, stoppages are unavoidable, and great inconveniency is of course sustained.

And

And it is thought, that the width of the *driftway* ought, like that of the hard materials, to be guided by the publicity of the given road. In a great public road, it should certainly be wide enough to let two carriages pass each other, or one pole in width. But in one of less publicity, or where the existing lane will not admit of that width, a single carriage path may suffice; as this being a continuance of the width of the hard road, no difficulty in passing can be experienced, it is supposed, from it.

But the width of the *foot-path* and the ditch may vary from half a pole to ten feet.

It is therefore concluded, that on these premises, the width of the lane of a great public road, near a populous trading place, ought to be fifty-nine feet and a half; and that of a common market-road, thirty-three feet. And these widths, without any previous intention, come out nearly the same as those directed by act of parliament, for the lanes of turnpike roads and highways. A great error in the act, however, is, that the lanes of all turnpike roads, shall be sixty feet wide: thus incurring a serious waste of land; and creating great nuisances; which green lanes ever are to the occupiers of adjoining lands. He from this suggests, that where existing lanes are wider than all the desired conveniences require, slips should be sold off their sides, and be laid to cottages, or to the adjoining inclosures; having recesses here and there, in which to lodge materials. It has long appeared to his mind an evident position, that every part of a public lane should be used; and consequently that no part of it ought to be a nursery for weeds, or an unprofitable common pasture for starving stock. Still he remarks, that a wide lane has its advantages; especially in a low close situation. It gives freer admission to the sun and air than a narrow lane, and the road dries more quickly. And further, that by permitting a more forcible current of wind, the pulverized materials, or dirt of the road is, in dry seasons, carried off in the state of dust; leaving the useful materials undisturbed. And it is highly proper to place the principal line of road in the midway of the lane, that it may be the most effectually exposed to the agency of the sun and wind.

Mr Beatson even suspects, that, in the whole kingdom, thousands of acres of fertile lands are lost to the public, merely by making the roads so much wider than there is any necessity for. In the vicinity of large towns, they should have an ample width, as 30 or 40 feet; or, in some cases, considerably more, as near the metropolis. But the practice of making them 40 or 50 feet wide, as is sometimes the case, through a thinly inhabited part of the country, or near the most pitiful villages, where even 20 feet would be sufficient, is, he contends, a mere waste of ground for no purpose, and occasions a very great additional expence in making such roads, which certainly might be avoided. Supposing the medium necessary width of road to be 7 yards, or 21 feet, and that the medium width now made is 11 yards, or 33 feet; this is, upon that supposition, 4 yards wider than is necessary; which, in every mile, is a loss of 1 acre 1 rood and 2 perches: and supposing there are 5000 miles of such roads in the whole kingdom, there is a loss of more than 6300 acres, which, if estimated the same as the improved value of the waste lands, at 27s. per acre, and at 30 years' purchase, would produce 255,150l.; a sum which, if laid out in improving the roads, and making easy communications through different parts of the kingdom, would be of the greatest public advantage. And it is evident, that where they have the width stated as necessary by the first of the above writers, the loss sustained in this way must be still greatly more considerable.

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Mr. Marshall thinks, that in the operation of forming roads of the public kind, the first business of the road-surveyor is to examine the lane, or other site of the intended road, in every part, to ascertain whether offensive waters lodge beneath it, and whether quicksands or land-springs break out in a wet season, in which this examination is requisite to be made. If defects of this kind be found, effectual subdrains are to be run up to them from the ditches or side-drains of the lane, or other site. And that the next operation is to adjust the surface of the site; to strike off the protuberances, and fill up the hollow parts; and thus, in ordinary cases, to mould it to the first proper form, or according to some of the other forms that have been mentioned; the foot-path and the higher side of the soft road being raised with the earth which is required to be taken off the bed of the hard road, whose base or foundation ought to be formed with peculiar care. Every part is required to be firm and found; dry earth or hard materials being rammed into every hollow and yielding part. It is suggested that the first form is adapted to firm binding materials; to such as acquire, by wear, a repellent surface, and shoot off the waters that fall upon it; not to those which are loose and incohesive, yielding to pressure, absorbing rain-waters, and conveying them down to the base or bed of the road. These require a flat or a convex bed, free from obstructions on either side, so that the absorbed waters may effect their escape at the base. And that on this firm and level bed the largest of the hard materials are to be laid; next, those which are more finely and evenly broken; and, lastly, a covering of still finer materials; to assist the roller in giving sufficient firmness to the surface, and to render it immediately capable of being travelled upon.

But in regard to the proper materials for constructing roads with, Mr. Marshall thinks that although every district may be said to have its own material, and often without choice or alternative, yet there may be instances in which useful materials are overlooked or disregarded. And that in some parts, particularly in Lancashire, large paving stones are in common use; some of the more public roads being rough pavements, resembling the streets of ill-paved towns. But that in the northern, and some of the midland provinces, broken quarry stones are the ordinary road material; and that, taking the kingdom at large, they are the most common material. But in the southern and western counties, flints and other hard field stones, gathered off ley grounds, are in common use; and in the neighbourhood of the metropolis, and in other parts of the kingdom, sharp flinty gravel is a favourite and valuable material. In many parts of England, smooth, water-worn, pebbly gravel, collected on the sea-beach, and in river beds, is used; and if the pebbles are of a hard texture, and be properly broken, to make them bind, or unite firmly together, a good road may be made of this material. In some cases, sand and silt, or fine sea-sand, have been employed with success.

It is likewise added, that the artificial materials of roads, which he has met with, in quantity, are the dross and cinders of iron and copper works; and burnt clay, (burnt as bricks in heaps,) which in a clayey district, destitute of other materials, and where fuel is cheap, may be found a valuable substance for the purpose. It is suggested by Mr. Beatson, that in a sandy soil the roads may be made on the new construction, he has already recommended, with the greatest ease. In such a soil, there will be nothing more to do than to level the surface properly, fill up all the hollow parts, roll it well with the long wooden roller, and lay on the materials intended to finish it with, in the manner directed,

rected, and then roll it with the heavy roller, as has been advised above.

But in cases where the soil consists entirely of a deep loose sand, the best and easiest way to make a lasting road is, to form it to the width intended for the hard materials, and then to let a channel be dug at least 18 inches in depth, and about the same width; let these be again filled, and firmly built up with strong turf or clay, or any other solid substance that will prevent the materials to be laid on the road from spreading to either side; openings being left at every 10 or 15 yards, to let the water that falls on the middle part of the road more easily through. Where the form of the ground requires making up, a little wall of the same nature, instead of digging a channel, may be built on each side, nearly as high as the surface of the road is intended to be. These will prevent the hard materials laid on from spreading, which is the principal cause of roads made in such soils giving way in so short a time; and these materials will not be so liable to sink into the sand, if it is properly rolled before they are laid on, as well as at different periods after it is finished. And if there be a fence on each side of the road, and materials can be spared to cover it from side to side, there will be the less occasion for the little walls; as these are only intended to keep the hard materials within the bounds prescribed, in case it is not judged proper to lay them the whole breadth of the road. Where, however, those walls are thought requisite, the spaces, by being covered with a little gravel or freestone-sand, will make very good foot-ways or horse-roads; but in a road finished in this way, there will be no occasion for horse-roads distinct from the main road, as the whole, if kept in proper order, will, he supposes, be sufficiently smooth and safe for horses, or even foot passengers, to go upon at any time. In speaking of the making of roads through a clayey soil, it is remarked that those formed in such districts are in common the most unpleasant of any, chiefly on account of proper precautions not being taken to prevent the water lodging on the surface; sometimes, perhaps, owing to a want of proper materials, such as stones or gravel: but he has often seen the very worst of clay roads, even where no such excuse could be given. And that it seems hardly ever to have occurred to those who had the direction of such roads, that sand, properly applied, would in a great measure remedy all the defects complained of; and there are few parts of a country where sand of some sort, or freestone-rock, or sandy gravel, may not be obtained by some means. In certain situations it may, no doubt, be more expensive and difficult to procure such materials than in others; but these are local advantages, which road-makers must lay their account with. But the excessive inconvenience of bad roads, the expence occasioned by the tear and wear of wheel-carriages and harness, the risk of dislocating the limbs of horses, together with many other disadvantages, ought to stimulate all concerned to exert their utmost endeavours to make roads good, and easily passable, be the difficulties what they may, that stand in the way of them.

It is hinted, that in such places as where no hard materials can be got, if the road were formed nearly in the same manner as that first noticed, the evils complained of might probably soon be remedied. The clay should be excavated, so as to form a ridge in the bottom of the excavation. There should be small openings or drains at every 10 or 15 yards, or at every hollow place, to conduct away the moisture into the main drains. If this excavation is then filled with sand, or any other porous matter easiest to be got, and finished as formerly directed, there is no doubt but the road would soon become as good as could be wished

for. Something similar to this he has known put in practice by a very ingenious gentleman in Cheshire, on whose estate, being a strong clay soil, the roads were so excessively bad as hardly to be passable. He dug away the surface of the road to the depth of 12 or 14 inches, and having the command of plenty of sand, he filled up the excavation therewith, and covered the whole with gravel; by which means he has now made, so far as completed in this manner, as pleasant a road as one could wish to travel on. He is not certain if he left the bottom of the excavation with a ridge in the middle, as here directed; but he is clear this would be an advantage, as well as the outlets at certain distances, to let away the water.

And in constructing roads through boggy or morassy soils, it is advised, after proper steps have been taken, to drain off as much of the water as possible, by deep ditches or drains within side the fences, if inclosed, or intended to be inclosed, on each side. These drains should be cast at least a twelvemonth before any thing else is done towards making the road; for if the place is very boggy, it will be found to subside considerably after the water is drained away; and some parts will subside more than others, in proportion to the depth of the mossy soil, and to the quantity of water lodged there. Those parts will, therefore, be the better seen the second season than the first. All hollows or irregularities should then be filled up and levelled, either by taking from the heights and filling up the hollows, or by some other proper materials nearest at hand. In either case, the surface sods should, with a push-plough or paring spade, be carefully pared off the heights to be lowered, and also off the hollows to be filled up. These sods should be laid aside, till those places are brought to their proper level, and should then be laid on again. This will make the whole surface of an uniform toughness, which would not be the case where the sods are not laid on in this way. After this has been done, the breadth of the intended part for receiving the hard materials should be marked off; then let that part be covered with sand, or such porous substance, as before recommended, to the thickness of at least 10 or 12 inches. Then roll this, and finish it as already directed; and there is no doubt but a road made in this manner may be as good through a moss as in any other situation. This he speaks of from experience, having seen the most pleasant roads made in this manner, through mosses formerly thought impassable. When the moss is too soft to admit horses upon it, the sandy stratum may be rolled by men, the weight of the roller being regulated by the stone box, according to their strength. Sometimes the rolling is altogether omitted; but it is much better to roll, when practicable. It is added, that there are other methods of making roads through mosses; as by laying a foundation of broom, furze, or heath, and then the hard materials above them. But sand is greatly preferable, where it can easily be got, and when the track of the road is properly drained, as it always ought to be, before any thing is laid upon it with a view of making a road. These principles and directions are, it is said, equally applicable on all other sorts of soil, with trifling variations, according to the peculiar circumstances of the cases.

And it is supposed, that in the above cases the roads were formed where the scite or track was nearly level from one side to the other; but there are other situations, such as when cut or formed on the sides of hills, where some other precautions become necessary to be attended to. In these cases it is observed, that in making them it frequently happens that the excavation affords a sufficient quantity of materials for the purpose; and the part cut out

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of the solid very rarely requires any covering laid upon it. This, however, depends on the nature of the soil. If the whole breadth of the road is formed from the solid, and that is sufficiently hard, no extraneous materials will be necessary; but if the soil is a compound of clay, or of a soft nature, the above rules and regulations must be had recourse to. And that where the parts are made up from the excavation, they ought to be formed considerably higher at first than the other parts, as they will naturally subside for some time afterwards, and the hard materials should not be laid on till they have sufficient time for that purpose, which may be greatly expedited by rolling; and it should be observed, that it is much better to be obliged to lower those parts to their proper level before the materials are laid on, than to be under the necessity of making up any of them at the time. And further, that where the hill is of a considerable height above the road, a good deal of water will sometimes come down. In this case it is in general better to intercept that water at some little distance from the side of the road, than to allow it to run down the face of the bank. If allowed to run down this face, it will very soon moulder it away, especially in frosty weather, and will always choke up any drain that may be made, whether covered or open; for if covered, the earth that moulders down will in a short time become so close, that water will not get through it to the drain before it runs off upon the road; and if open, it would be extremely difficult and troublesome to keep it clear. In this case, by intercepting it about four or six feet from the brink, and conducting it away to the most convenient outlet, it would be much easier to keep the road dry. If the face of the bank be irregular, the water may still be conducted away, by making the drain recede from the brink at such places, and keeping the course always at a proper level, or it might, he supposes, be let off at every hollow place by small recesses faced up with stone, or by wooden spouts sunk upright in the bank at every such hollow; to conduct the water from the upper drain to a cross covered drain below the road, by which it may be carried away at the lower side, without any injury being done to the road. And it is advised, that in the forming and making of these, as well as all other roads, the preventing of any water running on them, except what falls from the clouds, should carefully be attended to. Where this cannot easily be done, and where it is necessary to allow a stream to run along the side of a road, the drains or ditches which, as before observed, should be within the fences, should be made of a proper size accordingly, as the small drains filled with sand or gravel, as already recommended, are only meant for such roads as can have no extra water coming upon them in this way.

But in respect to *private* roads, the nature and manner of laying them out has been already noticed. And in respect to the method of forming them, Mr. Marshall says, it is the same where strong cohesive binding materials are made use of, whether in a lane, or across open ground. The mode he advises is to form a receptacle for such hard materials, twelve or more inches deep; either by digging to this depth beneath the natural surface, and carrying off the excavated soil; or to half the depth, disposing of the soil raised in the operation on each side of the receptacle; so as to elevate the general surface of the road above that of the adjacent ground. And in this receptacle deposit the materials; leaving the surface either in a convex or a semi-convex form, as the turn of the surface of the ground to be travelled over may direct: the margin or margins of the road, at which the rain-water is to be collected, being

left a few inches beneath the adjoining sward. But that in forming roads of every description with sand, loose gravel, or other incohesive absorbent materials, which imbibes the rain-waters that fall on them, a receptacle of that kind is altogether improper. Such materials ought to be laid on a level or an elevated surface; and a shallow drain to be open on either side, for the absorbent waters to filter into; thus preventing a furcharge, and freeing the surface entirely from collected moisture, which would be highly injurious to it. And it is here added, that the surface of a road which is formed of well-broken stones, binding gravel, or other firmly cohesive materials, and which is much used, presently becomes repellent of the water which falls upon it; no matter as to the basis on which they are deposited; provided it is found and firm enough to support them. And that where the situation is low and the land of a moist retentive nature, a deep drain on one or on each side may be proper to give due firmness and stability to the base. Such drain, however, is not to be sunk close along the margin of the hard materials, to deter horsemen and carriage-drivers from coming near it, but a few feet distant from it; so that every inch of the hard road may be used with equal pleasure and safety, and a commodious driving and walking path be formed between the road and the drain; proper channels being cut across it, in order that it may be kept properly dry. And further that in a dry situation, as across a gravelly or stony height, little more is frequently required than to remove the surface mould, and lay bare the rock or the bed of gravel beneath it; and then to give the indurate base a round or a shelving form, as the lying of the ground may require. In this way a travelling road may be made, and kept up at one-tenth of the expence incurred by the ordinary practice in this case; which is to gather up the surface soil into a ridge, and on this soft spongy bed to lay coat after coat of some hard materials, fetched perhaps from a distance! at much expence for the purpose.

But in addition to the above sorts of roads there are still others, which require some art to form and keep them up in particular situations; these have the denomination of carriage and horse-tracks, and are described under these different heads.

Methods of Repairing Roads.—It is noticed by the author of the "Landed Property of England," that this is a business that incurs a heavy expence on landed property, and of course requires the peculiar attention of the proprietors and managers of land. And in the paper mentioned above it is observed, that where the funds of the parish will admit, which would generally be a saving, that proper persons should be appointed in them, or have the charge of a certain extent of road to see where any part is giving way or getting out of order, and to direct their immediate repairs. Also to take care that no water stands in the hollows or ruts upon them. And, that the summer season is the best not only for making, but for repairing roads, nor ought they on any account to be touched in winter, unless to give a temporary aid to some sudden breach that is perhaps almost impassable, or to let off any standing water. Yet nothing is more common than to see a number of labourers employed on the highways in winter, when the days are short, and but a few hours labour can be obtained of them. Indeed so little attention is there often paid to repairing the highways, that sometimes old infirm people are employed for the purpose, as if repairing roads were a sort of trifling bye job, merely for the employment of paupers, or lame, miserable objects, who can get no other means of subsistence. And Mr.

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Marshall thinks, that in this sort of work, the best service of the surveyor is to keep their surfaces smooth and even; so that rain-water may find a free and ready passage to its proper drain. Ruts and hollow parts are to be filled up, level, or even with the general surface, as often as they are formed, and perfectly free from water. This attention is more especially requisite to a new made road, whose bed and foundation are not yet fully confirmed. But in every case, and at all times, a solicitous regard is due to this most important, yet most neglected part of road surveying. Much expence of materials and labour may thereby be saved, and the great end of road-making be fully obtained: namely, that of rendering the road in all seasons easy, safe, and pleasant to the traveller, as well as easy in the conveyance of all sorts of articles. Besides, he conceives, that in this operation, as well as that of making new roads, very much depends on breaking the materials *evenly*. For, by doing this, the wear of the road becomes regular. Where the heads of large stones rise above the general surface, they become obstacles to carriages, and stumbling blocks to horses; beside their tending, by the jolting motion which they give to carriages, to indent the surface on either side of them, and thus to increase the roughness, and hasten the decay of the road. It is added, that by the law of gravitation and the action of wheel-carriages, a pit or hollow place in the surface of a road is made deeper every time the wheel of a carriage passes through it. The periphery of the wheel acts as a chissel, and in falling into the hollow receives an impetus or acquired force in addition to the actual weight it is loaded with; and, in addition to this, an undue proportion of the general load is, by placing it out of its upright posture, taken from the upper and thrown upon the lower wheel. Likewise hard protuberances, beside being dangerous or disagreeable to travellers, whether on horseback or in carriages, are injurious to a road, as being the causes of pits and hollow places in its surface. Every hard protuberance, as the point of a stone standing above the general surface of the road, or a large stone lying loose upon it, is productive of four impressions: namely, two, by throwing additional weight upon the opposite wheels (going both ways), and two more by the impetus or acquired force of the wheels (passing both ways) in falling on the surface of the road. He therefore considers it to be the first duty of the surveyor, not only to fill up the ruts and hollows, from time to time, but to pick out or to crush with a heavy hammer the stones, whose tops rise above the general surface; as well as to gather off those which lie loose upon the road; the latter being an operation that is readily performed, yet frequently neglected, and in some places to a shameful degree, especially in the northern parts of the island.

And in respect to the sizes most proper for road-stones it requires much latitude. Not only the intended use of the road, but the nature of the material is to be considered. A road for broad-wheeled carriages of burden, only, may be made of larger stones than one for narrow wheels. And hard stones require to be broken smaller than those which more readily wear down, and form a travelling surface. For when once the surface of the materials becomes united and cemented together, and its rock-like texture established, the stones that are crushed, and the smaller fragments which are splintered on, in wear, serve, he supposes, to incrust and bind together the stratum of stones which lie next, in succession, beneath: especially if proper attention be paid to the irregularities of wear, and to bring back the surface, wherever it is requisite, to its original evenness of convexity where that form is adopted:—so that it may, in

every part, act as an arch, and may be able to resist, with the greatest firmness, the weight with which it may be impressed. It is, however, to be observed, that, in forming and repairing roads with stones of size, a considerable share of the expence arises from the labour of reducing the materials; and, in consequence, the smaller they are broken the greater becomes the expence. This, on ordinary occasions, is a serious consideration. Hence, in constructing and repairing common roads, it is advisable, instead of reducing the surface stones to small fragments with the hammer at a great cost, to cover them with materials that are already reduced; as the rubbish of stone quarries, soft stones, or gravel, or the scrapings of the road to be repaired. Such cementing materials being washed and worked down by rains, and the action of carriages, and the feet of travelling animals, among the surface stones, assist much in binding and fixing them in a firm crust; and in making the road immediately passable by horses and light carriages; most particularly if the whole be compressed, and united together with a heavy roller (suitable to the purpose), repeatedly passed over the surface of it. And another good method of saving expence in this way, where materials are readily procured, is that of placing the coarse unbroken stones or other hard materials in the bottom part or bed of the road, covering them over with gravel, or other sorts of materials that are of a small kind. However, where the hard materials are broken down small and evenly the roads are found to wear the best.

The proper materials for repairing roads are in a great measure the same as those which are used for the making of them in the first instance. The writer of the Agricultural Report of Middlesex thinks the rounded stony materials of the nature of flint, found in gravel pits and river bottoms, are in every respect more fit for roads than any other flinty matters. The materials for the support of great public roads should, it is supposed, be selected from among such stony substances as are tough as well as hard; for this purpose, hornblende is believed to be particularly suitable, to which may be added whinstone, basalts, iron-ore, and all such stones as contain iron, as well as the slag, or the refuse of furnaces. The comparative weight which stones of similar size and figure can support without being broken, is, it is imagined, the criterion by which to try them for this use.

Mr. Beaton thinks, that if the above directions were strictly attended to, and every appearance of a breach or defect in a road at once repaired, the same materials, when displaced, would very often, if properly relaid, and fit for the purpose, repair the part beginning to fail; whereas, if neglected for some time, and allowed to get much out of repair, it will probably require a considerable additional quantity of materials, and thereby occasion a great deal of expence that might have been saved. He also suggests, that during the time of hard frost, it may be very proper to drive materials, and lay them down for the purpose of being at hand to repair the roads when the season permits, but such a time is the most improper of any for applying those materials. And that in laying them down it is a very general practice to place them in small heaps along the sides of the road, and even encroaching sometimes very much upon the space allotted for travelling on. This ought on no account to be allowed (unless those materials are to be immediately used), for reasons so obvious, it is unnecessary to mention them. It would be much better to have recesses at certain convenient places, for the purpose of laying the materials in till wanted; by which means the inconveniencies attending the common way would be totally avoided;

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avoided; and travellers might then, without interruption, use any part of the road they found best; and besides, there would then be less occasion for making the roads so wide as they are generally made, which would undoubtedly save a great deal of money in keeping them in repair, or proper condition.

It is stated, that rolling of roads with a heavy roller, as directed above, would be a very beneficial practice in keeping them in good repair, especially if the hard materials, that are worked out of place by the wheels of carriages, are raked in again previous to the roller passing over them. This would be an easy and expeditious operation, and if taken in proper time, would, in many cases, be all that is necessary to put the road in repair. It is, however, an implement that is very seldom made use of for this purpose by the overlookers of roads.

And the use of machinery has probably been hitherto too little attended to in the execution of this sort of work; but from the increasing price of hand-labour, it certainly at present demands the serious notice of the managers of this sort of business. For dragging over roads, when much out of repair, in order to replace the stones or gravel disturbed by wheel-carriages, a sort of harrow has been invented by Mr. Harriott of Great Stanbridge, in Essex, for which he received a premium from the Society for the Encouragement of Arts, &c. and of which he gives the following account. "Being appointed surveyor of the roads at Michaelmas, 1786, and finding them very bad, I provided a sufficient quantity of stones and gravel against the next summer, to cover the roads pretty thick; but when so done, I found the heavy loads of chalk, gravel, and corn, soon turned the stones out, and made almost as deep a rut or rake as ever. Stubbing the quarters in I found an endless job, as well as a great expence; I, therefore, contrived the road-harrow, and by the help of which I have, during the last summer, at a very trifling expence to the parish (after the ruts were again filled up with stones), kept the roads in extraordinary good condition. A man, a boy, and two horses will do three miles in length in one day, completely harrowing down the quarters, and drawing the stones together, which, by means of the mould-boards, are dropped into the ruts, far better than a man can stub them in. Now, if a man was employed to stub, he could not do it for less than a penny *per* rod, of sixteen feet and a half, (the most common is three halfpence, or two-pence *per* rod, if they stub the outside as well as the inside quarter,) which would amount to one pound six shillings and eight-pence for one mile in length, consequently to four pounds for three miles, which the road-harrow will do in one day; and for which I charge the parish for man, boy, and horses, only eight shillings." And it is further stated by him, that it does the work better, as well as cheaper; that several other parishes are using them, and he thinks the use of them will soon become general, especially where roads are mended with gravel. The head of the harrow is three feet long, from outside to outside of the bars. The bars four inches square, and the length of them five feet. The mould-boards extend eleven inches farther, which is necessary to draw the stones (which the teeth of the harrow work up to the top) nearer the middle of the road. The mould-boards are four feet two inches long, ten inches deep, and two inches thick; they are shod with a bar of iron, and lined about six inches high with an iron plate. The teeth (which should be sleeted at the points) are one foot in length, from the under side of the bars to their points; they are one inch and a quarter square, and are fixed with strong nuts and screws, with collars both on the under and upper side of

the bars. The bars are made to go lengthwise instead of across, to prevent them from splitting. The harrow is drawn by two horses abreast, a boy leads the outside horse on the outer quarter, the other horse goes on the horse-path, the man steadying the harrow by the handles. Of course they take one inside, and one outside quarter as they go, and the other two quarters as they come back. And as this harrow is certified, by several people in the parish where it is used, to do more work with one man, a boy, and two horses, in one day, and in a much better manner than could be effected by twenty men in the same time in the usual way, it must certainly produce a prodigious saving both of time and money, and having been found to answer the purpose so extremely well, renders it worthy of attention by those engaged in this kind of work.

Mr. Beatson suggests, that after the use of this harrow, the heavy roller, noticed already, would have a very good effect, or there might be a roller of a lighter construction fastened behind the harrow, to roll at the same time; although the heavy roller would certainly make the best work. And likewise that other implements, nearly on the same principle, have been constructed, particularly one of which he was shewn a model by a gentleman near Cheller. Its shape is in form of an isosceles triangle, which is laid upon the road, and drawn by shafts at the base. The two sides, by meeting in an angle opposite the base, are supposed to draw the loose materials towards the middle of the road. It has two small wheels near the base or front, and one at the angle in the rear, with different contrivances for fixing the whole frame higher or lower as required.

It is also suggested that a machine for the more easily breaking stones to repair roads in the common way would be of very great use, as at present this is a tedious and laborious task. Under the article MACHINE, a very ingenious contrivance for removing the mud and dirt from roads has been described. But, although several contrivances have at different times been proposed for facilitating the repair of roads, and lessening the expence, yet that expence, Mr. Beatson says, is no doubt very great, especially in those places where many heavy-loaded carriages are continually passing. The ruts made by the wheels soon become so deep, and the materials of the road are thereby so much torn up, that it is almost an impossibility, however hard the materials, to keep the road for any considerable time in proper condition, or state of repair. It is, therefore, suggested, that these effects should be attempted to be remedied by some means or other, as by a sort of roller so fixed as to prevent the wheels from sinking so as to form ruts.

It is evident that the principles and directions which have been given apply equally to private or parochial roads, which in general are in a worse condition, from their being commonly worse managed. The causes of their being in bad condition should be attended to and removed, as much as possible, in the manner already suggested, as it is evident that they must have a great effect in promoting improvements in agriculture, by lessening the expence of labour, and facilitating the means of conveyance of different articles. The effects of some sorts of wheels have been more destructive to roads than others, and of course acts of parliament have been formed with the view of affording proper regulations in this respect. See WHEEL and WAGGON.

In speaking of the draft from friction on the roads, Mr. Middleton, after considering what happens on those made with gravel, and on iron railways, concludes, that, on gravelled roads, friction is not more than one-fifth part of the entire draft; the other four-fifths being occasioned by the

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the obstacles of dust, sludge, loose sand and gravel. Hence it follows, he thinks, that by removing these obstructing causes, and keeping the roads constantly clean and hard, the draft would be so much lessened, as to render the present number of labouring horses unnecessary. It is suggested, that many of these inconveniences may be got rid of; and the roads be in the way of getting more dry, clean, and hard, by removing the offending matter while in the state of dust, when it occupies the least possible space, and is in the most favourable condition for being taken away. A small portion of dust, it is said, when drenched with rain, becomes a large quantity of sludge, in which state it requires much labour to clear it away; on which account it is very advantageous to get quit of it before rain falls. This is, it is supposed, best effected by means of bush-harrows wrought every windy day. But some might be taken away after being scraped together by suitable machinery for the purpose.

It is intimated, that the time seems to be approaching, when iron must be made to contribute largely towards the public roads. It is thought that iron rails, or bars, may be laid along the present turnpike roads, in such a manner as to afford the most convenient track for all heavily laden carriages; and that this may be done without any material inconvenience to those of lighter weight and swifter speed. The great original expence of making such roads will, it is supposed, be sufficiently counterbalanced by their much longer duration, and the trouble fully compensated by the superior pleasure of travelling over them.

On the whole, it is supposed, that the keeping of roads in the most perfect repair is an object of high importance; for that until canals, or inland navigation, became general, the supply of the markets, and the price of every article, will be in proportion to the state of the roads over which they have to pass in their way to towns. Bad roads, it is said, require a greater number of horses to draw any given weight along them, than would be necessary for the conveyance of the same weight over good ones; which extra draft must be paid for by increasing the price of the article to the consumer. The same number of horses which, along *bad roads*, could only bring a scanty supply of the produce of the country from a small distance, can, on *good roads*, convey a more abundant supply, and from greater distances: which is calculated to lower the price of the necessaries of life in the metropolis and other large towns, rather than *advance* them in the distant counties, and have a happy tendency towards *equalizing* the prices between the towns and the country.

And the author of the paper already noticed, thinks it a matter of great consequence to have proper regard to the nature of the fences on the sides of roads, as on these the goodness of them, and the expence of upholding them, very much depend. Where the form of the ground and situation will admit of it, the sunk fence from the road, that is, with the deepest part towards the field, is by far the best. A fence of this sort, in the form of a ditch or drain, may be made of any depth without the least danger or inconvenience, which is not the case when open to the road; and the deeper it is made, the better effect it will have in keeping dry the foundation of the road, if properly constructed; nor will the road require to be so wide as usual, at the same time there will be fully more room to travel on; for if the fences are of this kind, the whole width of the road may with safety be occupied, but when open to the road a considerable space is lost, by the fear or danger of approaching too near them. And the fences on the sides may either be of stone, sod, or a hedge or paling; but ought not to be more than eighteen

inches, or two feet above the level of the road (except a paling), and the top of them, if broad enough, may, in some places, be made to serve as a foot-path. Nevertheless, the fence towards the field may be six feet in height, or as high as the purpose of it requires. The road will thus receive the whole benefit of the sun, which is very essential towards keeping it dry, as well as the depth of the drains or ditches within the field, to which there must be proper openings at certain distances, as before recommended; and in winter, after heavy falls of snow, there will be little chance of a road fenced in this manner ever being blocked up, for it will be observed, when a storm of snow is attended with a high wind, that the drifted snow lodges chiefly about the fences, or where it meets with an obstacle to occasion an *eddy*; for where high fences are on the sides of roads, they are almost to a certainty in such cases blocked up, to the great inconvenience of the whole neighbouring country or district in which it happens. The planting of trees on the sides of roads should always be avoided as much as possible; but where rows of them are to be put in, it should never be done at less than ten or twelve feet distance from the fences, and not less than forty or fifty feet from each other, being constantly so situated as not to produce much shade on the road in the middle of the day.

ROAD, in *Ornamental Gardening*, that sort of carriage-way which is peculiar to residences of the country kind. They are of many different sorts, according to the nature, circumstances, and situations of the different places. But when properly laid out and formed, they have mostly one of the effects of building, at least, in a partial manner, which is that of giving force and spirit to scenes of verdure and cultivation. They should be laid out according to the nature of the situations; their directions and widths being provided by their conveniences, propriety, and utility. The methods of making and repairing of them are much the same as those employed for other kinds of roads; but in the finishing, their surfaces should be laid over with a finer and better coloured material of the gravel or some other sort, and they should be kept more perfectly rolled down and level; as the colours of such surface materials and the margins of such roads are principally what concerns picturesque effect, or that which is to be produced by them. In situations where the scene is avowedly of the artificial kind, the margins of them, according to the author of the work on "Country Residences," should be parallel to each other, and correctly defined; as in that part of an approach-road, which comes within the parapet or fence which incloses the mansion, or in those roads which are within the bounds of the other more adorned parts of the ground. But in situations where the roads are not in these scenes, but are either in picturesque or natural pleasure-grounds, pasture-fields, parks, forests, dingles, or other similar places, the edges should be irregular, and more or less rough or smooth, blending or ragged, as is seen to take place in roads or tracks through similar scenery in wild nature. The excellent effects and superior advantages which result from the adoption of these principles in the formation and construction of roads of this nature, may often, it is said, be seen in those parts of much frequented approach-roads of residences, which are not thought proper or necessary to be subjected to the operation of the paring-iron, and the formal trimming of the gardener. And indeed, that one of the most striking deformities in picturesque scenery, is that of the formal, stiff, and harsh edges of made roads, as they highly disgust the spectator, and prevent the true effect which should be produced.

All roads of this sort should, therefore, be laid out, and formed

formed in such a manner as to harmonise as perfectly as possible with the nature, circumstances, situations, and scenery of the particular places in which they are to be had recourse to. See *WALK*.

ROAD, Approach, that variety of this sort of road which is peculiar to residences, mansions, or houses of the country kind, and which leads or conducts to their principal or other entrances. In their manner of being laid out, they should in their directions neither be too affectedly graceful, have too much waving in their appearance, be too much beset and intercepted with trees; or be too vulgarly formed in the rectilinear and direct manner, or be too abrupt in their nature. There is a certain kind of dignity, propriety, and fitness requisite in them, which is not easily described, but which, in given situations and circumstances, readily presents itself to the mind of the designer; and in consequence of the whole of the operations, both of conceiving and designing them, being so simple, they are, for the most part, marked out upon the ground with great facility,—easily improved upon, and, in their execution, the work is merely that of road-making.

The accompanying circumstances which appertain to roads of this nature have been already pointed out in speaking of them in general, and they ought to be well attended to, as much of their beauty and effect arise from them.

The only proper approach-roads to castles, Mr. Loudon says, have been supposed those of the avenue kind, but that there seems no reason in nature for such a rule; and the arguments drawn from antiquity are wholly insufficient to justify their constant introduction in such cases. However, wherever they exist with good effect, they should, it is said, be carefully preserved; and even, in some situations, avenue roads to mansions, straight private roads through monotonous cultivated countries, or public roads passing along eminences, may be created and formed with great advantage and effect, as is the case in many places. Roads of this kind should always be so contrived as to afford the best effect, and to produce the greatest harmony, which the places are capable of admitting.

ROAD, Drive, another description of road belonging to residences of the rural sort, which is chiefly designed to shew and display the beauties of the places, or of the surrounding country, or of both at the same time. They are principally had recourse to in residences of the more extensive and elegant kind, being mostly contrived without any great difficulty. The main circumstance to be attended to in this business, is that of only shewing one sort of rural character at one time, but to display the whole, in succession, as much as possible. They are commonly formed, as to the road part, without much labour or trouble, being often simply made by levelling, and the materials upon the spot; they may, however, be constructed in the same manner as the other roads in such situations.

The leading, or striking characters of the spot, are here to be particularly regarded.

ROAD-Gage, a contrivance for the purpose of breaking road stones, or other hard materials, by. A ring, or an oval, of iron, of the proper size for the intended use, with a short handle fixed to it, will answer this intention very well. These gages are of great use in breaking stones by the load, or in other ways, before they are laid upon roads; and should always be known to the workmen previous to their undertaking the business. See *ROAD Stones*.

ROAD-Harrow, an implement of the harrow kind, contrived for the purpose of forcing in the sides of the ruts. One represented in the Essex Agricultural Survey levels the

ruts and combs very expeditiously. It was invented by Mr. Patten, and costs 5*l*. See *ROADS*.

ROAD-Horse, such a one as is employed in the teams on the road, and which in general performs the most laborious work. Under this description comes the greater part of all the horses in constant use, as it includes carriage horses of every kind, roadsters, and hacks. Road-horses of every denomination are, from their constant hard work, entitled to a proportionable degree of care and attention with the best horses in the kingdom; and should undergo the useful part of stable management, that so much contributes to the preservation of health in horses of a superior description. Those which have incessant labour, or which travel post, must be supplied with at least from one to two pecks of corn a day. Large and strong carriage horses, in perpetual work, require considerably more, or they will become apt to lose flesh by frequent perspiration. These rules, however, offer only a kind of general standard.

ROAD-Materials, all such substances as are employed, or made use of, in the making and repairing of roads; as those of stony matters of different kinds and qualities, various sorts of gravel, sand, and a variety of other articles. They should, in every case, be reduced as much as possible to the same sizes, as the regular wear of roads depends very much upon it. See *ROAD*.

ROAD-Pick, an useful implement of this kind with three points. It has much resemblance to the common pick-axe, only differing from it in having the flat edge-like end of that tool occupied by three strong tines, about six inches in length, and standing about six inches in width from the outside to the outside of them. It thus forms a sort of small trident, which is borne on the shank of the implement, and stands about six or eight inches from the socket and handle.

It is a very convenient tool in striking off the protuberances, and filling in the ruts of hard roads; as well as to level and adjust the surface with, in forming and repairing stone roads. The single end is likewise capable of being employed for letting off water from shallow ruts, or hollow places, as well as for many other uses of the common pick. See *PICK*.

ROAD-Plough, an instrument of the plough kind, invented and made by the late Mr. Brand, an ingenious blacksmith, in the county of Essex, at Lawford, near Manningtree. It is formed all of iron, and represented in the Agricultural Survey of that district. Its length is that of a common plough, with two small wheels, one before and the other behind; and the coulter part is strongly secured.

ROAD-Roller, a heavy kind of iron roller, formed in three separate parts, used for rolling down the loose materials on roads. It is drawn by a horse or horses in shafts, somewhat as in the common roller. See *ROADS*.

ROAD Scraping Machine, a contrivance made for the purpose of cleansing roads from dirt, &c. These machines are constructed in several different ways, by different makers; but a very useful one may be seen under the head *Machine*; which see. See also *ROAD*.

ROAD-Stones, all kinds of stones, whether of the field, quarry, or other sorts, that are employed in the forming and mending of roads. For some uses of this nature, the stones should be considerably reduced, even in constructing or repairing ordinary roads. Mr. Marshall has suggested, that by dropping road-stones through circular gages of different sizes, it will be found that, for repairing small breaches, those which pass freely through a ring, $2\frac{1}{2}$ inches in diameter, may be considered as of a middle size; and that

that for new forming or fresh covering the surface of a road, none ought to exceed 4 inches; $3\frac{1}{2}$ inches being, for these purposes, the middle size: that 2 inches and 4 inches may, as a matter of general information, be set down as the extremities of size of road-stones of a middle quality, for the above purposes. See *ROAD-GAGE*.

ROAD-Surveyor, a person who has the care and management of a road, whether in the making or repairing of it. All such persons as are employed in this way should be well acquainted with the nature of laying out, forming, and keeping them in order. Each of the different methods, which are in common practice, ought to be well understood, as well as those had recourse to in particular districts or places. And, besides, he should be well informed with regard to every thing of a local nature that has any relation to them, and be a man of exertion and ingenuity.

ROAD-Team, any sort of team that is employed on the road, whether in carts, waggons, or other kinds of carriages. All teams of this nature should in general be well kept. See *TEAM*.

ROAD-Work, all such kind of work as is done upon the road, either by the labour of men or animals. It is also sometimes applied to the business of making and repairing of roads.

ROAD, in *Navigation*, denotes a place of anchorage at some distance from shore, and sheltered from the winds, where vessels usually moor to wait for a wind or tide proper to carry them into harbour, or to set sail.

When the bottom is clear of rocks, and the hold firm, and the place well covered from the wind, the road is said to be good. An open road is one which has but little land on any side.

The roads within his majesty's dominions are free to all merchant vessels, either of his subjects or allies. Captains and masters of ships who are forced by storms, &c. to cut their cables, and leave their anchors in the roads, are obliged to fix up marks or buoys, on pain of forfeiture of their anchors, &c.

The masters of ships, coming to moor in a road, must cast anchor at such a distance as that the cables, &c. may not mix, on pain of answering the damages. When there are several vessels in the same road, the outermost to the seaward is obliged to keep a light in his lantern in the night-time, to apprise vessels coming in from sea. See *PORT*.

ROAD Aqueduct, is an arch under a canal, through which a road passes.

ROAD Bridge, a bridge over a canal for the use of a road, instead of private use. See *OCCUPATION Bridges*.

ROAD, Cock. See *COCKROAD*.

ROAD-Goose, in *Zoology*, the name of a small species of wild goose. See *Anser* under *DUCK*.

ROADER, a vessel riding at anchor in a road, bay, or river.

ROADING, a term used on the Fen rivers, for cutting off the weeds at their bottom.

ROADING, in *Agriculture*, a provincial term used to signify the striving of teams for the lead on the roads. It was formerly much in use in Norfolk, but is at present nearly laid aside, probably from the danger that attended it.

ROADSTER, among *Horses*, a term frequently applied to such as are used for the purpose of riding.

ROAITHA, or *ROUAITHA*, in *Geography*, a town of Arabia, in Yemen; 56 miles S. of Medina.

ROAK, a provincial word, signifying a mist or fog.

ROAN, in *Geography*, a small island in the North sea,

near the north of Scotland. N. lat. $58^{\circ} 35'$. W. long. $4^{\circ} 11'$.

ROAN, in the *Manege*. A roan horse is one of a bay, sorrel, or black colour, with grey or white spots interspersed very thick. When this party-coloured coat is accompanied with a black head and black extremities, he is called a roan with a black-a-moor's head; and if the same mixture is predominant upon a deep sorrel, it is called claret-roan.

ROANCARRICK Rocks, in *Geography*, rocks in Bantry bay, on the S. coast of Ireland; 3 miles N.E. of Beat island.

ROANE, a county of America, in the district of East Tennessee, containing 5581 inhabitants.

ROANE-Tree, in *Botany*. See *SERVICE-Tree*.

ROANNE, in *Geography*, a town of France, and principal place of a district, in the department of the Loire, which here becomes navigable, and renders it a convenient staple for all goods conveyed from Lyons to Paris, Orleans, Nantes, &c. The place contains 6992, and the canton 14,790 inhabitants, on a territory of 225 kilometres, in 13 communes. N. lat. $46^{\circ} 2'$. E. long. $4^{\circ} 10'$.

ROANOKE, an island in the Atlantic, on the coast of North Carolina, at the entrance into Albemarle sound, with a town of the same name. The north point of the island is about 7 miles W. of Roanoke inlet. N. lat. $35^{\circ} 50'$. W. long. 76° .—Also, a long and rapid river, formed by two principal branches, viz. Staunton, which rises in Virginia, and Dan, which rises in North Carolina. It empties itself into Albemarle sound, about N. lat. $35^{\circ} 58'$. W. long. $76^{\circ} 56'$. This river is navigable for sea-vessels nearly 30 miles; but for boats of 30 or 40 tons, to the falls. Above the falls, boats of 5 tons ascend about 200 miles. The planters on the banks of this river are supposed to be the wealthiest in North Carolina.

ROANOKE, Little, a river which discharges itself into the Staunton, about 15 miles above the junction of the Dan and Staunton.

ROANOKE Inlet, a channel on the coast of North Carolina, which leads into Albemarle sound. N. lat. $35^{\circ} 56'$. W. long. $76^{\circ} 14'$.

ROANPOUR, a town of Bengal; 17 miles S.S.E. of Mauldah.

ROARAGUR, a town of Hindoostan, in Vissiapour; 22 miles N. of Sottarah.

ROARING BULL Island, an island in the North Atlantic ocean, near the east coast of Nova Scotia. N. lat. $45^{\circ} 17'$. W. long. $60^{\circ} 44'$.

ROARING River, a river of America, in the state of Tennessee, which runs N.W. into Cumberland river, 12 miles S.W. of the mouth of Obas river.

ROARING Water Bay, a bay on the S. coast of Ireland, in which is a number of small islands; 6 miles S.W. of Skibbereen. N. lat. $51^{\circ} 28'$. W. long. $9^{\circ} 22'$.

ROARING Water, a river of Ireland, which runs into the fore-mentioned bay, 5 miles W.S.W. of Skibbereen.

ROASCHIA, a town of France, in the department of the Stura; 8 miles S.W. of Coni.

ROASTING, in *Metallurgy* and *Chemical Manufacture*, is a process by which the volatile parts of metals and minerals are separated by the application of heat. The minerals are generally mixed with the fuel, and fired in heaps exposed to the open air. When the volatile substance is driven off with difficulty, the reverberatory furnace is sometimes employed.

This process is frequently, though improperly, called *calcining*, since the latter is confined to the oxydation of metals.

metals. In expelling the volatile parts from lime-stone and gypsum, the process is termed *burning*, and in the latter sometimes *boiling*. The term roasting is principally confined to iron, and other ores abounding with sulphur and arsenic.

The iron ores of this country are roasted for the purpose of expelling sulphur, water, and carbonic acid. The former would probably injure the quality of the iron in smelting; the latter would contribute to an expenditure of the heat of the furnace. The process is conducted in the open air, by piling the iron-stone and small coal in alternate strata, allowing the mass to burn till the coal is consumed. The iron-stone, by this means, becomes of a red colour, and loses much of its weight. In some iron-works the process is performed in kilns, similar to those employed for burning lime-stone.

The ore from which zinc is obtained is generally blende, which is the sulphuret of that metal. It is exposed to the strong heat of a reverberatory furnace, by which the sulphur is expelled, and the metal oxydated.

When the metals or their oxyds are themselves volatile, and are combined with sulphur, roasting is not practicable: recourse must then be had to some other agent, which will combine with the sulphur, and separate the metal itself. Such is the case with *cinnabar* and *arsenic*. See the respective metals.

ROASTING, in *Domestic Economy*. When that change by heat which animal food undergoes to render it fit for digestion is brought about by a temperature capable of partially changing the surface, the process has been termed roasting; a similar change in vegetable food, such as bread, puddings, and pies, being termed baking. The most ancient method of roasting, which is still the general practice, is by turning the meat before the fire; and it is still supposed, without any good reason, that meat cannot have its proper flavour when roasted in any other way. It is true that *roasters* or *ovens* of the common construction are apt to give the meat a disagreeable flavour, arising from the empyreumatic oil which is formed by the decomposition of the fat, exposed to the bottom of the oven. This evil has been completely remedied in two ways, first by providing against the evil of allowing the fat to burn, and secondly by carrying off by a strong current of heated air the empyreumatic vapours.

The roaster used in the Derby Infirmary, and in many private houses in the neighbourhood, is not on any account objectionable, but it is particularly valuable in an economical point of view. This is principally effected by casting the heat entirely upon the object of roasting, instead of sending three-fourths of the heat up a capacious chimney, and expending the greatest part of the remainder upon the cook, and the walls and furniture of the kitchen.

The roaster above alluded to is made of sheet iron, of the strength of about one pound to the square foot: its form is that of a parallelepipedon, about twenty-five inches high, twenty-two long, and eighteen in breadth. The fire is put under it; but one course of bricks is placed immediately over the fire, and above this a cavity of five inches deep between the brick roof and the oven bottom. The flame of the fire passes a little to the right and left, and rises perpendicularly up the sides of the roaster, freely communicating with the top of the same. By this means the flame and hot vapour will be the hottest at the top of the oven, because of its greater levity, and its not being allowed to escape at this point, according to the common practice. After the hot vapour has bestowed its heat on the superior part, it now descends and enters on each side the cavity under the oven, from whence it passes up the back of the same,

which back forms one side of the smoke chimney. This arrangement is sufficient for distributing all the disposable heat equally on every side of the roaster. We shall next point out the contrivance for disposing of the smell above alluded to. The door of the oven is cased with wood, a piece of thick paper, itcepted in a solution of alum, and smeared with clay, being placed between the wood and the iron, to prevent the wood from being charred. The door extends below the bottom of the oven about three inches. This, when the door is open, exposes a plate three inches deep, and the width of the oven, and which constitutes the front of the cavity under the oven. At one side of this plate is a hole at the entrance of the tube, which extends to the other end of the cavity, where it is bent, and returns on the other side of the cavity, and opens into another cavity formed by a double plate, which constitutes the iron part of the door. The first entrance of this tube corresponds with an opening at the bottom of the door, so that when the door is shut, cold air can enter the tube. In its passage it becomes heated, and then enters the oven at the top, from the cavity in the door. It now passes over the meat, and escapes through a tube in the back plate, which extends so high as to reach above the smoke damper. By this means the roaster is constantly cleared of any disagreeable vapour, by a force equal to the draft of the chimney.

A sliding rake is made, so as to fit the top and sides of the oven, that the whole surface becomes perfectly scraped by one motion.

ROATO, in *Geography*, a town of France, in the department of the Tanaro; ten miles N.W. of Asti.

ROB, in *Pharmacy*, the inspissated juice of any substance, usually boiled up to the consistence of honey.

There are robs made of quinces, sloes, cherries, mulberries, elderberries, barberries, gooseberries, and other fruits, for various diseases. The juice of grapes, thus prepared, is more particularly called *rob*, or *sapa simplex*; this is almost of the consistence of honey.

When only one-third of the humidity is boiled away, it is called *defrutum*; and when only boiled to the consistence of a soft electuary, a *resin*.

The word *rob* is pure Arabic; and signifies originally a juice dried in the sun, or over the fire, that it may keep the longer without damage.

Sometimes it also denotes a composition of some juice made up with honey or sugar, in which sense it is confounded with *loche* or *lohoc*.

The rob is a form now much out of use, though there are several directed in the college dispensatory; as robs of black cherries, of sloes, of quinces, of elder, &c.

It is possible that great improvements might be made, by introducing the use of this form among the malt-distillers. The great inconvenience attending that art being, that the malt being of a large bulk, in proportion to its saccharine part, and requiring a larger proportion of water to extract that saccharine part, many large vessels, such as mash-tubs, coolers, fermenting backs, &c. are necessary; and the necessary labour on the subject is increased, and the commodity rendered dearer. The remedy of this should seem the introducing a new art subservient to that of the malt-distiller, and confining itself to the boiling down of malt-wort to a rob, so as to supply the malt-stiller with his subject, in the same manner as the fine-stillers are supplied with treacle from the sugar-baker. By this means the business of the malt-stiller would be reduced to a great degree of simplicity, and the spirit produced would be also much finer than at present, because the subject would come tolerably refined to his hands, and purged of its gross, mealy, and husky matter,

which yields a disagreeable oil in distillation, and is also apt to burn to the still, and spoil the spirit. It is possible that a spirit purer and finer than that from treacle might this way be procured from malt, prudently managed. Shaw's Lect. p. 219.

ROBALI, in *Geography*, a town of Abyssinia; 75 miles S. of Miné.

ROBALO, in *Ichthyology*, a name by which some have called the *camuvi*.

ROBARES, in *Geography*, rocks near the S. coast of Ireland; three miles S.E. of Gally Head. N. lat. $51^{\circ} 31'$. W. long. $8^{\circ} 50'$.

ROBASOME, a town of France, in the government of the Po; eight miles N.N.W. of Turin.

ROBBEN, or SEAL, *Island*, an island on the coast of Africa, near the Cape of Good Hope, at the entrance into False bay, about six miles in circumference. It serves as a place of exile for criminals sent from the Cape or the Indies, who are compelled to labour, and are guarded by twenty-four soldiers under the command of a serjeant. No women are permitted to live upon the island. Within this island and the continent there is excellent anchorage, where ships driven out by the S.E. winds, which blow from September to the end of April, the season when all ships bound for the Cape resort to Table Bay, usually bring up. Here, too, ships intending to come into Table Bay usually wait the abatement of the S.E. wind, if it should happen to be too strong for their working up against it. This island is too small, and at too great a distance, to afford the least shelter to Table Bay in the N.W. winds that blow in the winter months. S. lat. $33^{\circ} 40'$. E. long. $18^{\circ} 20'$.

ROBBERY, ROBBERIA, or *Roberia*, in *Law*, a felonious and forcible taking away another man's goods or money, from his person, presence, or estate, by putting him in fear, &c. 1 Hawk. P. C. 95.

A mere attempt to rob was held to be felony, so late as Henry the Fourth's time (1 Hal. P. C. 532.); and afterwards it was only a misdemeanor, and punishable with fine and imprisonment, till the stat. 7 Geo. II. cap. 21. which makes it a felony, transportable for seven years, unlawfully and maliciously to assault another, with any offensive weapon or instrument, or by menaces, or by other forcible or violent manner, to demand any money or goods, with a felonious intent to rob. If the thief, having once taken a purse, returns it, still it is a robbery. The previous putting in fear is the criterion that distinguishes robbery from other larcenies; and yet this putting in fear does not imply any great degree of terror or affright in the party robbed; it is sufficient that so much force, or threatening by word or gesture, be used, as might create an apprehension of danger, or oblige a man to part with his property without or against his consent. (Fost. 128.) Thus, if a man be knocked down without previous warning, and stripped of his property while senseless, though strictly he cannot be said to be *put in fear*, yet this is undoubtedly a robbery; or, if a person with a sword drawn beg an alms, and I give it him through mistrust and apprehension of violence, this is a felonious robbery. 1 Hawk. P. C. 96.

This is sometimes also called *violent theft*, and its punishment, be the value of the thing taken ever so small, is death.

This species of larceny is debarred of the benefit of clergy by 23 Hen. VIII. cap. 1. and other subsequent statutes; not indeed in general, but only when committed in or near the king's highway. A robbery, therefore, in a distant field or foot-path, was not punished with death (1 Hal. P. C. 535.), but was open to the benefit of clergy, till the

stat. 3 & 4 W. & M. cap. 9. which takes away clergy from robbery wheresoever committed.

The word is said to have taken its rise hence, that anciently robbers only took away the *robes* or clothes from travellers. Though lord Coke, in the third of his Institutes, takes the name to have had its rise from Robin Hood, who lived under Richard I. in the borders of England and Scotland, by robbery, burning houses, rape, and spoil. Hence, also,

Robbers-men, or *roberds-men*, mentioned in several statutes for great thieves.

ROBBING. See *HOUSE-Robbing*.

ROBBINS, or ROBANDS, *i. e.* *rope-bands*, in a *Ship*, small lines, or braided cordage, which make the upper edges of the great sails fast to their respective yards, being reeved into eyelet-holes in the head of the sail under the head-rope for that purpose. They are generally of a sufficient length to pass two or three times about the said yard. The word is, *make fast the robbins*; for at sea they do not *fast*, *tie*, but *make fast*.

ROBE, ROBA. See *GOWN*.

ROBES, *Master of the*, is an officer of the household, with an appointment of 500*l.* a-year, who has the ordering of all his majesty's robes. See *MASTER of the Wardrobe*.

He has several officers under him, as a clerk of the robes, a yeoman, three grooms, a page, a brusher, furrier, sempstresses, laundresses, starcher, and standing wardrobe-keepers at St. James's, Windsor castle, Hampton-court, &c. There is also in the establishment of his majesty's household a mistress of the robes, with an appointment of 500*l.* a-year, and two keepers of the robes. See *WARDROBE*.

ROBES to Minstrels. Innumerable bands of tumblers, buffoons, rope-dancers, musicians, players on instruments, and actors, were formerly retained in the courts of princes, who, by their gambols, farces, sports, and songs, diverted the company. These were called in Tuscany *Giullare* and *Giocolari*, and, by those who mentioned them in Latin, *Joculares* and *Joculatores*. These fabricators of amusement never departed without being well rewarded. But what appears the most extraordinary and different from our present customs is, that the costly and gorgeous robes, which it was usual for princes to receive from other great personages who visited their courts at feasts, or upon their marriage, as marks of their friendship and respect, were bestowed on these people. Benvenuto Aliprando, an old rustic poet, in his Chronicle, describes a marriage at the great court of Mantua, in the year 1340, while under the dominion of the Gonzaga family. "At that time," says he, "the different princes and nobles of Italy, whose names he mentions, presented the Gonzaghi with a variety of rich and precious vestments, which were called *robe*, robes, and which were afterwards given to musicians and buffoons," as the old poet informs us in the following lines:

"Tutte le robe sopra nominate,
Furon in tutto trent' otto e trecento,
A buffoni e sonatori donate."

"And all these costly robes of states,
In all three hundred thirty-eight,
To fiddlers and buffoons were given."

The family of Gonzaga, in return, reciprocally exercised munificence towards the nobles who visited them, as the same old poet informs us in the following rude verses:

"Otto giorno la corte si durare
Torni eri, gioftri, bagordi facia,

Bellar, cantar', e sonar facean fare,
 Quattro cento sonator si dicia
 Con buffoni alla corte si trovæ.
 Roba e danar donar lor si faccia.
 Ciascun molto contento si chiamoe, &c."

" Eight days these sports were held, where valiant knights
 In tilts and tournaments their prowess show,
 And minstrels, full four hundred, crown the rites,
 While dance and song teach ev'ry heart to glow.
 To these and each buffoon who here was found,
 Or gold was given, or robes of costly sort ;
 And all, so well their spritely arts were crown'd,
 Depart contented from the splendid court."

With what magnificence the princes of the house of Visconti supported their court at Milan, during the same century, is frequently described by Corio the historian; but he particularly excites our wonder by his account of the solemn pomp with which the nuptials of Lionel, duke of Clarence, son of Edward III. king of England, was celebrated in 1368, with Violante, the daughter of Galeazzo Visconti, duke of Milan. This event is circumstantially related by several other ancient historians of Italy; and Aliprando of Mantua tells us, that Lionel gave five hundred superb dresses to the minstrels, musicians, and buffoons, who were then assembled at Milan; that Galeazzo presented them with many more; and Bernabo, his brother, rewarded them munificently with money on the occasion.

The splendid robes and gorgeous attire of bards and minstrels at all times are upon record. The flowing vest of Orpheus, in the triple capacity of priest, legislator, and musician, is specified by Virgil; Arion is related by Herodotus to have leaped into the sea, in the rich vestments he usually wore in public; Suidas speaks of the saffron robe and Milesian slippers worn by Antigenides; and the performers in the tragic chorus, which used to be furnished at the expence of some wealthy citizen of Athens, wore also a splendid and costly uniform.

In France the *Jongleurs*, and in Provence the *Troubadours*, or minstrels, during the middle ages, had frequent presents of costly robes from their patrons. In the "Fabliau Conte," or Tale of the red Rose, a female complains to a *vavassor*, or yeoman, of his having taken from her a robe, to give to the minstrels.

" Bien doit estre vavassor vis,
 Qu'il vuet devenir menestrier ;
 Miez voudroi que fussiez rez, (rafé)
 Sans aigue (eau) la teste & le coul,
 Que ia n'y remanist chevoul,
 S'apartient à ces jongleours,
 Et à ces autres chanteours,
 Qu'ils ayent de ces chevaliers,
 Les robes, car c'est lor mestiers."
 Fabliau de la Rose vermeille.

" I would not own the wretch for kin,
 Who wou'd the minstrel trade pursue,
 He'd better *dry* shave head and chin,
 And, with the hair, cut off the skin,
 Than herd with such a worthless crew.
 Let splendid knights with usual pride,
 On siders lavish such rewards,
 But 'tis to meaner fools denied
 To strip themselves for vagrant bards."

The custom of presenting musicians with superb and expensive dresses during the 14th century, in the manner al-

ready related, seems to have travelled into England, and to have continued here till after the establishment of the king's band of four-and-twenty performers; part of their present salary being still paid at the wardrobe office, as an equivalent for the annual dress with which they used to be furnished at his majesty's expence. To this we may add, that the *waits*, or musicians who attend on the mayor and aldermen, in most of our incorporate cities and towns, are furnished with splendid cloaks.

ROBE, in *Geography*, a river of Ireland, which, rising in the eastern part of the county of Mayo, flows westward by the town of Ballinrobe; a few miles west of which it discharges itself into Lough Mask.

ROBEC, a river of France, which runs into the Seine, a little below Rouen.

ROBEK, a river of France, which runs into the Meuse, near Stevenswaert.—Also, a river of France, formed by the union of the Clarence and the Nevee, which, after a short course, runs into the Lys, 2 miles E. of St. Venant.

ROBEK, or *Robeque*, a town of France, in the department of the Straits of Calais; 3 miles S. of St. Venant.

ROBEL, a town of the duchy of Mecklenburg; 9 miles S. of Wehrau. N. lat. 53° 10'. E. long. 12° 45'.

ROBER, a river of France, which runs into the Moselle, at Treves.

ROBERDSMEN. See ROBBERY.

ROBERGIA, in *Botany*, received that appellation from Professor Schreber, in memory of Laurence Roberg, professor of physic in the university of Upsal, who was born in 1664, and died in 1742. His most curious, though very compendious and superficial publication, entitled *Grundvahl til Plantekjenningen*, is an anonymous introduction to botany, on Tournefort's plan, of 20 duodecimo pages, with as many rude wooden cuts of flowers, to illustrate the principal classes. Of the fifteen various inaugural dissertations, published under the presidency of Roberg, only two are botanical; one being that of John Olaus Rudbeck, on the *Sceptrum Carolinum* (see RUDBECK); and the other by Lofsberg on the Generation of Plants.—Schreb. Gen. 309. Willd. Sp. Pl. v. 1. 752. Mart. Mill. Dict. v. 4. (Rourea; Aubl. Guian. v. 1. 467. Juss. 369.)—Class and order, *Decandria Pentagynia*. Nat. Ord. *Terebintaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, roundish, concave segments, permanent. *Cor.* of five roundish petals, the length of the calyx. *Stam.* Filaments ten, inserted into the receptacle, the length of the corolla; anthers roundish. *Pist.* Germen superior, roundish, villous; styles five, capillary; stigmas rather thick, furrowed. *Peric.* Drupa ovate, most convex on one side, slightly hollowed out at the other. *Seed.* Nut the shape of the drupa, of one cell, with a bivalve shell.

Ess. Ch. Calyx in five deep segments. Petals five. Drupa superior, of one cell. Nut with a bivalve shell, and single kernel.

1. *R. frutescens*. Willd. n. 1. (Rourea frutescens; Aubl. Guian. v. 1. 467. t. 187.)—Native of woods in Guiana, belonging to the parish of Aroura, flowering in August. The stem is shrubby, supporting itself by branching over the neighbouring trees. Leaves alternate, pinnate, of three or four pair, with an odd one, of stalked, elliptical, pointed, entire leaflets, from an inch and a half to three inches long; smooth above; downy and whitish beneath. Flowers in axillary, branched panicles, white, with a scent sweeter than that of lilac. Fruit black, with a greenish kernel.

ROBERT, in *Biography*, emperor of Germany, sur-

named the *Short*, born in 1352, was count palatine at the time of the deposition of Wenceslaus; and Frederic, duke of Brunswick, who was first elected by the German princes to supply the vacancy, having been assassinated, Robert was chosen in his stead in 1400. Wenceslaus had sold the dukedom of Milan to John Galeazzo, who had withdrawn his state from the sovereignty of the empire, and by force of arms had annexed to it several neighbouring towns and districts. Robert, therefore, invited by the pope and Florentines, led an army into Italy, and entered the duchy of Milan; but he was so much harassed, as to be obliged to march back to Germany, without having effected any thing. On his return he was involved in some petty wars with princes and states, who disputed his authority; and a confederation was formed against him, which subsisted during the whole of his reign. The most inveterate of his opponents was the elector of Mentz, who began to build a castle at Hochst, in defiance of him. Robert assembled troops to reduce him to obedience; but having advanced to Oppenheim, was seized with a fever, which proved fatal to him in 1410, at the age of 58. He was a prince of more prudence than enterprise, but possessed qualities which would have rendered his reign happy in less turbulent times. He was just, clement, and pious, an enlightened politician, and a lover of learning, as he manifested by founding the university of Heidelberg.

ROBERT, king of France, son of Hugh Capet, was associated by his father to the crown in 988, and succeeded him in 997, being then in his 27th year, and highly esteemed for his qualities both of body and mind. He had married Bertha, daughter of Conrad, king of Burgundy, and widow of Eudes, count of Blois. As he was distantly related to his queen, and had also stood god-father to one of her children by her former husband, his marriage was considered as invalid by Gregory V.; the parties were commanded to quit each other, and to submit to seven years' penance, on pain of excommunication. The king refusing to comply with this mandate, the sentence was issued against him, and the greater part of his own bishops joined in it. The effects of this excommunication are a striking example of the superstition of the age. The lords of his court broke off all intercourse with him, and the servants, who remained to wait upon him, shewed their horror of his situation by throwing to the dogs all the relics of food touched by the king or queen, and burning the vessels they had used. It was even reported that the queen was delivered of a monster. At length the king gave way, and parting with Bertha, by whom he had no issue, espoused Constance, daughter of the count of Arles, a beautiful woman, but violent and capricious, who disquieted all the remainder of his life.

The death of the duke of Burgundy, the king's uncle, without lawful heirs, in 1002, caused that rich inheritance to fall to the crown of France; and after a war carried on for some years with another claimant, Robert obtained possession of the country, with which he invested his second son, Henry. The termination of this war gave much satisfaction to the king, who was more inclined to the arts of peace than to military exploits; and he occupied himself in cares for the regulation of his court and household, and the cultivation of letters and religion among his people. He built and repaired many magnificent religious edifices, and merited the title of the devout. By the persuasion of the queen, he associated his eldest son, Hugh, in the government, in his 18th year. This prince, disgusted with the haughtiness and avarice of his mother, withdrew from court, and was guilty of some disorders; but by the mild treatment of his father, he was brought back to his duty. In

1022, Robert displayed his attachment to orthodoxy, by causing a council to assemble at Orleans, for the purpose of inquiring into a heresy introduced from Italy, which had been embraced even by some distinguished ecclesiastics. Several of the culprits were burnt alive, in the presence of the king and queen; the latter of whom manifested the fury of her zeal, by thrusting out an eye of one who had been her confessor, as he was led to execution. On the death of the emperor Henry II., in 1024, an Italian party offered the imperial crown and kingdom of Italy to Robert, or his son; but the king had too much wisdom to involve himself in a war on such a project. In 1026 he lost his eldest son Hugh; on which event, he associated in the crown his next son, Henry, notwithstanding the opposition of Constance, who preferred her son Robert. He died at Melun, in 1030, or 1031, about the age of 60, after a reign of 33 years. This prince was extremely beloved by his subjects, on account of his mildness, justice, and piety.

Robert was contemporary with Guido d'Arezzo. He was a great musician, and a good poet: he wrote several hymns for the church, and set them to music. They have been preserved among the ecclesiastical chants, and are still the most agreeable in its service. Constance, his second wife, pressed him to write a hymn in her praise; and he made her believe that the hymn "Constantia Martyrum" had been written for her, and she was satisfied.

Trithemius writes, that Robert made a pilgrimage to Rome, and deposited on the altar himself, at St. Peter's, his hymns, in the presence of the pope.

One of his best hymns is "Veni, Sancte Spiritus." To him is likewise ascribed "Chorus Novæ Jerusalem;" the "Prose on the Ascension;" "Rex omnipotens Die odierna;" "Sancti Spiritus adit nobis Gratia." Laborde.

ROBERT I., king of Scotland, of the family of Bruce, memorable as the restorer of the independence of his country, was grandson of that Robert Bruce who was the unsuccessful competitor with John Baliol for the crown of Scotland. But the death of his father, who left him heir to his estates and pretensions, with that of John Baliol, whose son was a captive with the English, inspired him with high designs both for himself and his country, which was then in a state of subjection to Edward; and having left the English court, to which, it is said, his purposes had been betrayed, he arrived in Scotland about the close of 1305, with the resolution of declaring himself. The Scottish writers mention Comyn as the person who had given information against him; but whether this were the fact, or some other cause of quarrel rose between them, it is certain that at an interview at Dumfries, in February 1306, Bruce with his dagger stabbed Comyn, who was afterwards dispatched by one of his associates. This deed of violence could be justified only by greater daring; and Bruce immediately proceeded to seize the castle of Dumfries, to confine the English judges assembled there, to assert his claim to the crown, and to summon all the friends of his family to his assistance. He was soon at the head of a body of troops, with which he penetrated as far as Perth, the English every where flying before him; and in March he was solemnly crowned at Scone, in presence of some bishops and nobles, and a great number of gentlemen. The king of England, highly enraged at the news of these events, ordered all the forces of the northern counties to enter Scotland, and join the family of Comyn, in order to take vengeance on the rebel, as he was termed. The earl of Pembroke marched to Perth, where he surprised and defeated Bruce's troops at Methven, in June, their leader himself escaping with difficulty. The broken remnant of his army was again routed by lord Lorn,

the

the nephew of Comyn; and Bruce, dismissing his few followers, was constrained to take refuge in an unfrequented isle of the Hebrides.

Neither friends nor foes were acquainted with the fate of Bruce, when he suddenly appeared at his estate of Carrick, at the head of a small but resolute band, with which he surprised an English lord, who had obtained a grant of that property; but on the approach of a detachment from the English army, he retreated to the Highlands. In the mean time, Edward was preparing for an expedition into Scotland with a force which was to reduce it to entire submission. He was soon after delivered from the most formidable of his foes, by the death of Edward I. near Carlisle, as he was just upon the point of entering Scotland with a great army. His son, Edward II., though he obeyed his father's dying injunction of marching into Scotland, yet pursued the war with no vigour, and soon returned to England to join his favourite Gaveston. Robert, who had reduced the western counties, left them in charge of his gallant friend, sir James Douglas, and proceeded against his enemies in the north. He afterwards made himself master of Inverness, and the northern districts; and at length, having taken the castle of Forfar and the town of Perth, he brought the whole of Scotland, except a few fortresses, to acknowledge his authority. In the beginning of 1314, there remained in Scotland only the castles of Stirling, Dunbar, and Berwick, in the hands of the English. Edward had now, after the death of Gaveston, reconciled himself with his discontented barons; and it was resolved that he should make an attempt to recover Scotland, with such a force as might overcome all resistance. At the head of the greatest army that had ever entered that country from England, he moved from Berwick in June 1314, and marched for Stirling, to relieve its castle, then besieged by Robert in person. The Scotch army, much inferior in number to the English, but composed of veteran troops, awaited the approach of the enemy on the banks of the rivulet of Bannock, in the road to Stirling. In a skirmish of cavalry preceding the engagement, Robert displayed his strength and prowess by cleaving down to the chin, with his battle-axe, an opposite commander, of the family of Bohun. This was an omen of the success of the great battle of Bannockburn, in which, through the able disposition and conduct of Robert, the Scotch obtained the most decisive victory over the English that their annals boast, and established the independence of their country. Edward himself narrowly escaped; and the number of noble prisoners was such as to enable Robert to recover, by exchange, his wife, daughter, and sister, with several men of rank, who had been the captives of Edward I. The king of Scotland followed up his success by an invasion of England, in which he ravaged the northern counties without opposition. He now thought himself strong enough to give the English government molestation in another quarter; and in 1315 he sent his brother, Edward, over with a body of troops to the north of Ireland, to assist the natives in freeing themselves from the dominion of England. Robert himself followed with a large reinforcement in 1316, but was compelled by famine to return; and his brother, after experiencing a variety of fortune, was defeated and slain in an engagement with the English near Dundalk.

The deposition and death of Edward II., in 1327, gave occasion to a breach of the truce on the part of the king of Scotland, who seems not to have considered himself as bound to the new government. In reality, however, he was tempted by the disordered state of England to renew hostilities, for which he had been some time preparing. Young Edward III. was not a prince to suffer an insult without

resistance and retaliation; and learning that the Scotch under Douglas and Murray, were making dreadful ravages in Northumberland, he assembled a powerful army, and went in search of them. They, however, eluded all his attempts to bring them to action, and retired to their own country. Edward dismissed his army, and in the same year a peace was agreed upon between the two nations, by an article of which the king of England renounced all claim to superiority over the kings or kingdom of Scotland; and thus the great object of Robert's reign, the independence of his country, was finally established. At the same time, his only son David, then five years of age, was contracted to Joan, Edward's sister. Robert was now nearly worn out with the cares and fatigues of his active life; and in 1329, at his castle of Cardross, he expired, in the 54th year of his age and the 24th of his reign, leaving a name memorable in the annals of his country, which he rescued by his courage and wisdom from a foreign yoke, and restored to its rank among nations. Hume. Henry. Univ. Hist.

ROBERT, king of Naples, son of Charles II., by the sister of Ladislaus, king of Hungary, born in 1279, was duke of Calabria at the time of his father's death, in 1309. The succession was disputed between him and the son of his elder brother, Carobert, king of Hungary; but the college of cardinals (Naples being then considered as a fief of the holy see) decided in Robert's favour. He was crowned at Avignon, and, in gratitude to the pope, exerted himself to oppose the Ghibelline or imperial party in Italy. At this time the crown of Sicily was in possession of Frederic III. of Arragon, who, for his defence against the king of Naples, formed an alliance with the emperor. Robert was ambitious to extend his dominion, and almost the whole of his reign was spent in fruitless attempts to conquer the island of Sicily. He also, during his contests with the Imperialists, aggrandized himself in Lombardy, and for some time he held the sovereignty of great part of Romagna, Florence, Lucca, Ferrara, Genoa, and several other places in Piedmont. He was the most potent prince in Italy of his age; but it is less on account of his political and military successes that he deserves commemoration, than because he was the greatest royal proficient in science and letters, and the most munificent patron of them, in the century in which he lived. Many of the early writers give their testimony to his merits in this respect; and Petrarch, in particular, in several parts of his writings, is profuse in his praise. Robert, however, is said, when a child, to have been so slow of comprehension, that it was with the greatest difficulty he could be taught the elements of grammar; and it was not till his preceptor had interested him in Æsop's Fables, that he exhibited any fondness for learning. The private character of the king was highly amiable, and the only fault with which he is taxed was a disposition to avarice, that grew upon him with his years. He had the misfortune of losing his only son, Charles, at the age of 31, on which occasion he exclaimed that the crown was fallen from his head. He died in January 1343, in the 64th year of his age, and 34th of his reign.

ROBERT, CLAUDE, a French ecclesiastic and chronologist of some celebrity, was born at Cheslay, a village between Bar-sur-Seine and Tonnerre, on the borders of Burgundy, in the year 1564. From some seminary in the province just mentioned, he went to pursue his academical studies at Paris, where he obtained an exhibition in the college of Cambray. As soon as he had been admitted to the degree of licentiate in canon law, he accompanied his pupil into Burgundy, where, in 1590, he was presented to a canonry of the Chapel-aux-Riche at Dijon. Afterwards he travelled with his pupil through

through France, Flanders, Germany, and Italy. At Rome he was introduced to persons of the greatest distinction, and received several marks of esteem from the cardinals Bellarmine and Baronius. It was in this city that he first conceived the plan of his "Gallia Christiana." He was afterwards nominated bishop of Chalons-sur-Saone; upon which event this prelate conferred a canonry of his cathedral upon his preceptor, and made him his archdeacon and grand vicar. The bishop was desirous of expressing his regard for our author, by collating him to other benefices; but M. Robert constantly refused any additional preferment. He discharged the duties of his appointments with the strictest fidelity, and died in the episcopal palace at Chalons in 1637, when about 73 years of age. The most considerable of his production is entitled "Gallia Christiana," &c. published at Paris in 1626, in folio, with an appendix, preface, and chronological tables of the popes and anti-popes, the Eastern and Western emperors, the kings of France and England, the councils of France, the indictions, &c. He left behind him materials for a second edition of this work, which were made use of by M. St. Marthe, whose new collections increased the work to three volumes folio. It was afterwards extended by the Benedictines to twelve volumes folio.

ROBERT DE VAUGONDY, a French geographer, was born at Paris in the year 1688. Little is known of his private history, but he became geographer to the king, and died at Paris in 1766. His works are "An Introduction to Sanson's Geography," 1743; "An Abridgment of the different Systems of the World," 1745; "Sacred Geography," 1746; "A Treatise on the Use of the Globes;" "A Portable Atlas;" and above all "Atlas Univerfel," published in 1756, consisting of 108 maps, upon a large scale, engraved with neatness and accuracy. He had a son, who for some time was the assiduous companion of his labours, and who assisted him in the "Atlas Univerfel," to which work is prefixed an historical preface, in six chapters, treating of the origin, progress, and present state of geography.

ROBERT DE BRIENNE, harper to Edward I. previous to his ascending the throne. The harp for many ages seems to have been the favourite instrument of the inhabitants of this island, whether under British, Saxon, Danish, or Norman kings. Many disgraceful circumstances are blazoned of the poor minstrels; it is therefore but just to relate those that redounded to their honour, and the Chronicle of Walter Heming furnishes an incident that well deserves to be recorded.

Edward I., according to this historian, about the year 1271, a short time before he ascended the throne, took his harper with him to the Holy Land; and this musician must have been a close and constant attendant on his master, for when Edward was wounded with a poisoned knife at Ptolemais, the harper, *citharada suus*, hearing the struggle, rushed into the royal apartment, and killed the assassin. This signal service from his bard did not, however, incline the monarch, afterwards, to spare his brethren in Wales. See Grey's Ode, "Ruin seize thee, ruthless king!"

ROBERT, *Herb*, in *Botany*. See GERANIUM.

ROBERT Bay, in *Geography*, a bay on the E. coast of Newfoundland.

ROBERT Bay. See *CUL de Sac Robert*.

ROBERTS'S Island, a small island on the Florida stream. N. lat. 24° 42'. W. long. 81° 33'.

ROBERTS'S Islands, a cluster of small islands in the Pacific ocean, the largest being eight miles long and from two to three wide, four others being very small; discovered in the

year 1792 by lieutenant Herget, commander of the *Dædalus* store-ship. S. lat. 7° 53'. E. long. 219° 50'.

ROBERTI, JOHN, in *Biography*, a celebrated professor of divinity among the Jesuits, was born in the year 1569. He commenced his academical studies at Liege, and continued them at Cologne, where, when he was twenty-two years of age, he entered into the society of Jesus. His proficiency in various branches of learning is highly commended, particularly in the belles-lettres, the several departments of theological learning, and ecclesiastical history. He was made professor of divinity, and created doctor of that faculty, at Mentz, discharging the duties of his post with great reputation, during a long succession of years, in that city, at Doway, at Treves, and at Wurzburg. He died at Namur in 1651, in the 82d year of his age. He was author of many works on theological subjects, of which the most important, and that which proves how deeply he was versed in scripture criticism, was entitled "Mythicæ Ezekielis Quadrige, hoc est, Evangelia Historiarum et Temporum Serie vinculata Gr. et Lat."

ROBERTON, in *Geography*, a township of Washington county, Pennsylvania, containing 899 inhabitants.

ROBERTSON, WILLIAM, in *Biography*, was born at Dublin in 1705, and received his grammar-learning under Dr. Francis Hutcheson, afterwards the celebrated professor of moral philosophy in the university of Glasgow. In the year 1722 young Robertson removed to that university, where he continued till the year 1725, when he was admitted to the degree of M. A. During this year there was a dispute between Mr. Sterling, the principal of the university, and the students, about the right of choosing the rector, in which Mr. Robertson took an active part, being selected by his fellow students to read their protest against the person, and his authority, who had been chosen rector in opposition to their wishes. Thus distinguished, he excited against himself the indignation of the principal, Mr. Sterling, and his rector, and was the only one of more than fourcore petitioners against whom they intituted proceedings. He was cited before the faculty, and after a trial which lasted several days a sentence of expulsion was pronounced. Mr. Robertson was satisfied of the justice of his cause, and presented a memorial on the subject to the duke of Argyle, through whose influence an appeal was made to the king, who appointed a commission to visit the university of Glasgow, with full powers to examine into and rectify all existing abuses. As a result of this enquiry, the right of electing their rector was restored to the students: the visitors on this occasion also, among whom was the earl of Hay, called the principal to a severe account for the public money which he had embezzled, and ascertained the right of the university to send two gentlemen, upon handsome exhibitions, to Baliol college in Oxford: they moreover annulled the expulsion of Mr. Robertson, and ordered that measure particularly to be recorded in the proceedings of the commission; declared the election of the rector, who had been named by the principal, to be void; and assembled the students, who immediately chose the son of lord Ross to be their rector.

While the visitors were exercising their powers, Mr. Robertson remained at London, and on the return of lord Hay he introduced Mr. Robertson to Dr. Hoadly, the bishop of Winchester, who made him known to Dr. Wake, archbishop of Canterbury; and he was entertained with much civility by both these prelates. He had, from a thorough conviction of its importance, devoted himself to the clerical profession; but at present being too young to be admitted into orders, he employed himself, while in London, in visiting public libraries, attending lectures, and improving himself

himself as opportunity offered. As soon as he was old enough to receive ordination, he was nominated by Dr. Hoadly to the cure of Tallow, in the county of Carlow. Here he continued till he was of age for priest's orders, to which he was admitted on the 10th of November 1729, and on the next day he was presented by lord Carteret, then lord lieutenant of Ireland, to the rectory of Ravilly, in the county of Carlow, and to another rectory in the county of Wicklow. In 1728 he married Elizabeth, the daughter of major William Baxter, by whom he had twenty-one children.

Mr. Robertson first appeared as an author about the year 1738, by a pamphlet entitled "A Scheme for utterly abolishing the present heavy and vexatious Tax of Tythes:" the object of this work was to pay the clergy and improPRIATORS a tax upon land in lieu of tythes, and it excited so much attention, that several editions of it were called for in a short space of time. In 1739 Mr. Robertson received from lord Cathcart a deputation to be his chaplain; and in the year 1743 he obtained leave from his diocesan to nominate a curate at Ravilly, and to reside some time in Dublin for the education of his children. Immediately on his settlement in this city he was invited to the cure of St. Luke's parish, which he retained about five years, when he returned to Ravilly. While in that city he formed a scheme, jointly with Mr. Kane Percival, to raise a fund for the support of the widows and children of clergymen within the diocese of Dublin, which has since produced very happy effects. In 1758 he met with a severe affliction in the death of his wife, to whom he was most tenderly attached, but he sustained the loss with exemplary resignation to the will of God. Soon after this he found a new patron in Dr. Richard Robinson, who had been translated from the see of Killala to that of Ferns, and who presented to Mr. Robertson the first benefice which became vacant in his lordship's presentation. Before, however, he could be collated to it, he, for the first time, had the "Free and Candid Disquisitions relating to the Church of England, &c." put into his hands; and, by the perusal, he was led to entertain such doubts respecting some points to which he would be required to declare his assent, as made him defer his attendance on the bishop. At length he received a letter from his lordship, calling upon him to come immediately for institution. Upon this he wrote a very affecting letter to the prelate, in which he returned the most grateful thanks for his kindness, but said he could no longer conscientiously comply with the terms required by law to qualify him for such preferment. "In debating this matter with myself," says he, "besides the arguments directly to the purpose, several strong collateral considerations came in upon the positive side of the question. The straightness of my circumstances pressed me close; a numerous family, quite unprovided for, pleaded with the most pathetic and moving eloquence. And the infirmities and wants of age now coming fast upon me were urged feelingly. But one single consideration prevailed over all these—that the Creator and Governor of the universe, whom it is my first duty to worship and adore, being the God of truth, it must be disagreeable to him to profess, subscribe, or declare, in any matter relating to his worship and service, what is not believed strictly and simply to be true."

Mr. Robertson, though he refused to subscribe for the sake of preferment, did not feel it necessary to quit the church, and continued to perform the duties of parish priest; but from this time he omitted the reading of the Athanasian creed, and some other parts of the public service which appeared to him to countenance unscriptural tenets. Finding, however, that this mode of conduct gave offence to some per-

sons, he resigned his benefices in 1764, and in 1766 he published, by way of apology to his friends for what he had done, his learned and ingenious little work, entitled "An Attempt to explain the Words Reason, Substance, Person, Creeds, Orthodox, &c." to which he subjoined the letter written to his bishop, of which an extract has been given above. He now came to London, where he met with a very cordial and liberal reception from many excellent men, who generously contributed to his support. In the following year he presented a copy of his "Attempt, &c." to the university of Glasgow, and, in return, received a most obliging letter, accompanied with the diploma of D.D. In 1768 he was nominated to the mastership of the free grammar-school at Wolverhampton, in Staffordshire, by the company of Merchant Taylors; which, though honourable to the patrons, was not lucrative to the doctor, the salary being only 70*l. per ann.*, and this was, for some years, diminished by a pension of 40*l.* to a superannuated predecessor. Dr. Robertson was, however, satisfied, and through the kindness of his friends was prevented from wanting what was necessary to his support. At one time he received from an unknown hand a present of 500*l.*, and from various persons stated assistance was sent him. In 1772 he was chosen one of the committee of the society of clergymen, &c. employed to draw up, and present to the house of commons, a petition praying for relief from the obligation of subscription to the 39 articles. In the course of a few years he had the misfortune to lose all his children one after another; and he himself died in May 1783, in the 79th year of his age. Dr. Robertson was possessed of great learning and an excellent judgment; he had a fine imagination, and a temper regulated by the mild and amiable spirit of Christ; and in his address and manners he was at all times easy and cheerful. When he quitted the church he was probably of the Arian school, but in the latter years of his life he became a firm believer in the simple humanity of Christ. He was mentioned by Mr. Lindsey, a few months before his death, as "the aged and venerable father of Unitarian nonconformity of our own days;" and in another work the same writer says, "the example of an excellent person now living at Wolverhampton, Dr. Robertson, has been a secret reproach to me ever since I heard of it." See Lindsey's Apology for resigning the Vicarage of Catterick, his Historical View of the Unitarian Doctrine, and Dr. Disney's Communications to the Gent. Mag. 1783.

ROBERTSON, WILLIAM, D. D., a celebrated historian, was born in 1721, at Borthwick, in Mid Lothian, of which parish his father was then minister. He received the early part of his education at Dalkeith, under Mr. Leslie, a master of high repute. In 1733 he entered upon his academical studies at Edinburgh. After the completion of his course, he obtained a licence to preach in 1741, and in 1743 he was presented, by the earl of Hopetoun, to the living of Gladsmuir, in East Lothian. On this living, which was not more than 100*l. per ann.*, he contrived to educate his six sisters and a brother, who, about this time, were left orphans by the death of both their parents. Here also he displayed his zealous attachment to the cause of liberty, by his efforts, in the year of the rebellion, in favour of the house of Brunswick, which he carried so far as to quit, for a season, his parochial charge, and join the volunteers of Edinburgh. He became, in a short time, distinguished for his eloquence and good taste as a preacher; and, in 1755, a sermon which he delivered before the Society for propagating Christian Knowledge, and which was the only composition of that kind that he ever published, raised him very high as a pulpit orator. It passed through five editions, and was translated

translated into the German language. He had, some years previously to this, begun to take a part in the debates of the general assembly of the church of Scotland, and, as he possessed great talents for business, as well as the powers of a public speaker, he acquired an ascendancy in that body which, during a long period, gave him the lead in the ecclesiastical politics of the country. In 1754 a "Select Society" had been established in Edinburgh, among the first members of which are found many names that, in process of time, became highly distinguished in literature and public life. Among the number of these was that of Robertson, who was most assiduous in his attendance, and obtained from it an increase of reputation. In the mean time he was deeply engaged in the studies necessary for completing the plan of an historical work which he had formed soon after his first settlement as a minister, and having taken a journey to London for the purpose of making arrangements for the publication, his "History of Scotland during the Reigns of Queen Mary, and King James VI." made its appearance in the year 1759, in two vols. 4to. He had, previously to this, as appears by the title-page of the volume, obtained the degree of D. D. It was received by the public with general approbation and applause. The celebrated Hume, so far from betraying jealousy or envy at the appearance of a competitor for the historic palm, took the warmest interest in the success of the work.

The History of Scotland appears to have been the most popular of the author's works, and it had passed through fourteen editions during the life of the author. It had, in every respect, a favourable influence on his fortune, since the fame which he acquired by the publication was probably the cause of his rapid promotion. He had removed to Edinburgh, in consequence of a presentation to one of the churches of that city, while it was in the press; in the same year he was nominated chaplain of Stirling-castle; in 1761 he was appointed one of the king's chaplains in ordinary in Scotland, and in the following year he was elected principal of the university of Edinburgh. Two years after this he was appointed to the post of historiographer royal of Scotland, with the salary of 200*l. per ann.*, so that, at this period, he was the best beneficed clergyman of his church. He was, moreover, the acknowledged head of the party which held the chief sway in a national church; and the period from his becoming principal of the university of Edinburgh, to his retreat from public life, was commonly denominated "Dr. Robertson's administration."

In the midst of the numerous avocations which his several offices created, he proceeded to collect materials for his "History of the Reign of the Emperor Charles V.," which he published in 1769, in three quarto volumes. This work was, like the former, received with high approbation; it increased his reputation both on account of the greater maturity of style to which he had attained, and of the more profound and varied research which the weight and copiousness of the theme led him to display. The introductory volume contained a view of the progress of society in Europe from the subversion of the Roman empire to the beginning of the sixteenth century, which was particularly admired, as presenting a masterly survey of the gradations by which the social institutions of antiquity have passed, through the barbarism of the dark ages, into all that characterizes the state of modern Europe. So highly pleased was Catharine, the empress of Russia, with the History of Charles V., that she conveyed her acknowledgments to the author in a present of a rich snuff-box set with diamonds.

In the year 1777, Dr. Robertson published his "History of America," in two vols. 4to., which, from the new views

of man and nature that it presents, and the magnificence and variety of its scenery, is perhaps the most entertaining of his productions. Either gratitude for the communications obtained from the Spanish court, or candour carried far beyond the bounds of moderation, led him to extenuate the cruelties that had been committed by that nation in their conquests in the new world, to a degree that brought upon him censure. The work proved so acceptable to the Spanish nation, that the author was unanimously elected a member of the Royal Academy of Madrid. In 1791 Dr. Robertson published "An Historical Disquisition concerning the Knowledge which the Ancients had of India, and the Progress of Trade with that Country, prior to the Discovery of the Cape of Good Hope." After this, Dr. Robertson's health began to decline, and in June 1793 he died at the age of 72. As an historian his style is pure, sweet, dignified without stiffness, singularly perspicuous, and often eloquent; the arrangement of his materials is skilful and luminous, his mode of narration is distinct, and his descriptions highly graphical; and he displays a sagacity in the development of causes and effects, and in his judgment of public characters and transactions, which is very remarkable in one who was brought up in retirement. "If," says one of his biographers, "there is less glow and ardour in his expressions of moral and political feelings, than some writers in a free country have manifested; there is, on the other hand, all the candour and impartiality which belongs to a cool temper, when enlightened by knowledge and directed by principle." To his private and social virtues the most liberal testimony has been given, even by those who were his opponents in church politics. See Dr. Dugald Stewart's Life of Principal Robertson.

ROBERTSON, JOSEPH, was born at Knipe, in Westmoreland, in 1726, and educated at Appleby school, from which place, in 1746, he went to Queen's college, Oxford, where he took his degree of M. A., and, on entering holy orders, he was presented to the vicarage of Hertford, in Hampshire. In 1764 he became an author, by contributing largely to the Critical Review, an occupation in which he continued more than 20 years. In 1770 he was presented to the rectory of Sutton, in Essex, and in 1779 to the vicarage of Horncastle, in Lincolnshire. In 1782 he published what he entitled "An Introduction to Polite Literature," a very small volume, and which cannot certainly deserve so high sounding a title. It has been reprinted several times. It is a sort of spelling-book or primer, with good rules for pronunciation. The author was, however, so tenacious of his property, that he attacked, with much severity, the late Dr. Paley, for copying a part of it without acknowledgment, into a little piece intended for the use of Sunday schools. Dr. Paley's reply and defence is that of a gentleman and scholar, and must be quite satisfactory to the candid reader. Mr. Robertson's next piece, "An Essay on Punctuation," was published in 1785; it is a work of considerable merit, and has gone through several editions. In 1788 appeared his "Dissertation on the Parian Chronicle." Mr. Robertson published, in 1795, a new "Translation of Telemachus;" and in 1798 "An Essay on the Education of Young Ladies," which was followed by an "Essay on the Nature of English Verse." He died in 1802. See Gent. Mag. vol. lxxii. Monthly Mag. Meadley's Memoirs of Dr. Paley.

ROBERTSON'S County, in *Geography*, a county of America, in the district of West Tennessee, bordering N. on Kentucky, and containing 7270 inhabitants. It is watered by Cumberland and Red rivers.

ROBERVAL, GILES PERSONNE DE, in *Biography*, an excellent

excellent mathematician of the 17th century, was born at Roberval, a feignory belonging to his family, in the diocese of Beauvais, in the year 1602. In the course of his education he discovered a strong inclination towards the study of the mathematics, with which he made himself very conversant. When he was 30 years of age he obtained the professorship of mathematics in the college of Gervais, at Paris; and afterwards he contested, with other candidates, the succession to the vacant chair of Ramus, which he gained by the superiority of his powers in disputation. He succeeded Morin as mathematical professor at the college-royal, the duties of which office he performed with high reputation so long as he lived. He was chosen a member of the Royal Academy of Sciences in 1666, and communicated to that body some curious experiments on the Torricellian vacuum, which he made in the years 1647 and 1648. He invented two new kinds of balances, one of which was adapted to the weighing of air. Roberval died in 1675, at the age of 73. His chief works are "A Treatise on Mechanics," inserted in Mersenne's "Universal Harmony." A treatise "On the Mundane System," written in Latin, attributed to Aristarchus of Samos, but generally believed to be his own production. Besides these he contributed several papers to the Memoirs of the Academy of Sciences: such as "Experiments concerning the Pressure of the Air;" "Observations on the Composition of Motion, and on the Tangents of Curve Lines;" "The Geometrical Resolution of Plane and Cubic Equations;" "A Treatise on Indivisibles;" at the end of which he has explained a new method for the transformation of figures, to which Torricelli gave the name of "Robervallian Lines."

ROBERVALLIAN LINES, a name given to certain lines, used for the transformation of figures: thus called from their inventor M. de Roberval.

These lines bound spaces infinitely extended in length, which are nevertheless equal to other spaces terminated on all sides.

The abbot Gallois, in the Memoirs of the Royal Academy, anno 1693, observes, that the method of transforming figures, explained at the latter end of M. de Roberval's Treatise of Indivisibles, is the same with that since published by Mr. James Gregory, in his Universal Geometry, and afterwards by Barrow, in his *Lectiones Geometricæ*; and that, by a letter of Torricelli, it appears that Roberval was the inventor of this manner of transforming figures, by means of certain lines, which Torricelli therefore called *Robervallian lines*.

He adds, that it is highly probable, that J. Gregory first learned the method in the journey he made to Padua in 1668; the method itself having been known in Italy from the year 1646, though the book was not published till the year 1692.

This account Dr. David Gregory has endeavoured to refute, in vindication of his brother. His answer is inserted in the *Phil. Trans.* an. 1694, and the abbot has rejoined in the French Memoirs of the Academy.

ROBESON, in *Geography*, a county of North Carolina, in Fayette district, bounded S. by the state of South Carolina. It contains 7528 inhabitants. The chief town is Lamberton.—Also, a township of Lancaster county, Pennsylvania; containing 1807 inhabitants.

ROBESPIERRE, MAXIMILIAM ISIDORE, in *Biography*, was born at Arras in 1759. His father, a barrister, having ruined himself by his prodigality, left France before the revolution, established a school at Cologne, where, however, he did not remain long, and he went from thence into England, and afterwards to America. Deserted by his fa-

ther, and his mother dying when he was only nine years old, he was taken under the patronage of the bishop of Arras, M. de Conzie, who caused him to be sent to the college of Louis le Grand, where he was taken on the foundation. From a very early age he was noticed for his love of independence; he was however timid, and in his temper gloomy and unfociable. He was extremely assiduous in his studies, and gave hopes of talent, that were not realized in after-life. In 1775, when Lewis XVI. made his entry into Paris, he was chosen by his fellow students to present to that prince the homage of their gratitude. Becoming a barrister in the council of Artois, he obtained a place in the academy of Arras. In the year 1789 he took an active part in all the revolutionary meetings, and was appointed a deputy from the province of Artois to the States-General. He manifested but little talent as an orator or legislator, but attached himself to Neckar, and then to Mirabeau, during the heights of their popularity; but when they became less carested by the people, Robespierre was the first to notice the difference, and deserted them for some other leader. The first time that he made himself at all remarked in the constituent assembly, was on the 20th of July 1789, when he opposed the scheme of martial law; and from that period, says his biographer, "he endeavoured to legitimize insurrection." By courting the people, and displaying a determined hostility to the royal prerogatives, he laid the foundation for future influence in the democratic party; and it has been considered a very remarkable circumstance, in connection with his future conduct, that the most frequent topic of his declamation was the injustice of capital punishment in any case.

After the dissolution of the constituent assembly, followed by the election of the legislative body, the members of which being all new, Robespierre's chief theatre of action was the Jacobin club, at which he was the principal speaker. He also published a weekly paper, entitled "Le Défenseur de la Constitution." He now took a decided part with the republicans, though it does not appear that he was an actor in the insurrection of the 10th of August, or in the prison-massacres of September. In the new assembly, which met in September 1792, he was returned a member for the city of Paris, and he soon became the head of the party called the Mountain, which was opposed to the followers of Brissot, who then possessed the ministerial power. He was now charged with the desire of making himself dictator, but his party in the senate was too powerful for his accuser to carry the point, and the assembly passed a decree to print and circulate the speech which he made in justification of himself. By this he became still more popular, and his subsequent exertions to bring the unfortunate king to trial, augmented his influence with the democratic part of the nation. Soon after the execution of Lewis, Robespierre, assisted by Danton and Marat, gained a most decided supremacy in the national convention, and the period commenced which has been emphatically, but justly, denominated the reign of terror. The Brissotines, to the number of twenty-one, were accused, condemned, and guillotined. After them followed the queen, the duke of Orleans, and other members of the royal family: The scaffold daily streamed with the blood of nobles, priests, and all who by character and condition could be suspected of being attached to the ancient government. In some of the provinces, massacres were perpetrated against whole orders of men, without distinction: the levelling principle was extended to all superiority of science and talent, and it seemed Robespierre's object to bring back an age of barbarism. At length his own confederates, Danton, Desmoulins, Fabre d'Eglantine, and others, were brought to the

block. In the midst of all these horrors he exhibited a festival, in which the existence of the Supreme Being was solemnly recognised; and as the restorer of religion, he appointed days for public worship.

The reign of terror was now become too intolerable to be endured. No man was safe from a tyrant whose bloody disposition seemed to grow with the acts of cruelty which it generated, and who had established such a system of domestic treachery, as destroyed the confidence of society, and subjected every individual to accusation. He lost his popularity, and a decree of the convention was passed against him: in the act of arresting him two pistols were fired, by which he was wounded in the head and the under-jaw. He endured in silence the pain of his wounds, and the upbraiding of his foes, and was carried to the same dungeon which he had made to many the passage to death. On the next day, after being taken, with his accomplices, before the revolutionary tribunal, he was led, July 28, 1794, to execution, amidst the acclamations and curses of thousands of spectators. Such was the well-merited end of Robespierre, in the 36th year of his age. Although a concurrence of circumstances enabled him to act a considerable part in the revolution, he was not one of the superior figures in point of abilities and force of character. Natural reserve, cunning, habitual dissimulation, and a total want of feeling, carried him through difficulties which might have overwhelmed a greater man; but as he never made a friend, and was unsupported by native courage, he sunk under the first serious opposition. He was regarded as incorruptible, and never accumulated money: nevertheless, he always took care to open the path of honour and wealth to his own creatures, and especially to his rivals, in order that he might have an additional method of ruining them. Upon the whole, he has left a name more the object of horror and detestation, than that of any other among the personages of the same awful drama.—Ann. Register. Lives of Remarkable Characters, who have distinguished themselves in the French Revolution. Biog. Anec. of the Founders of the Fr. Rev.

ROBIA HERBA, in *Botany*, a name given by Paulus Ægineta, and many others, to a plant used in dyeing.

The near resemblance of the name to the word *rubia*, has made many conclude that it was the *rubia*, or madder, which they have meant by it; but they have taken care in their writings to distinguish it from that plant, and it is plainly the *geniſtella tinctoria*, or dyer's weed, that they meant by the *robia herba*. They say it was used to dye yellow, and that it was also a custom to stain the hair with it.

These are the properties recorded of the *cymene* and *acemenium* of the Greeks, and the *lutum*, or *lutea herba*, of the Latins, which were names of the *geniſtella tinctoria*. Pliny says, that the *lutum* had leaves like flax, and flowers like broom, which is exactly the case with the *geniſtella tinctoria*, but by no means agrees with the *glatum* or woad.

ROBISSOU, in *Geography*, a town of Austrian Poland; 22 miles S. of Chelm.

ROBIGALIA, or **RUBIGALIA**, in *Antiquity*. See **RUBIGALIA**.

ROBILLANTE, in *Geography*, a town of France, in the department of the Stura; six miles S. of Coni.

ROBIN, or, as it is more usually called, *Robin red-breast*, *Rubecula*, in *Ornithology*. See **RED-BREAST**.

ROBIN, *Ragged*, in *Botany*. See **CAMPION**.

ROBIN, *Wake*. See **WAKE ROBIN**.

ROBINAL, in *Geography*, a town of Mexico, in the province of Vera Paz; containing 800 inhabitants; 40 miles S.S.W. of Vera Paz.

ROBIN-HOOD'S BAY, a bay on the E. coast of Newfoundland, frequented by small vessels.

ROBINIA, in *Botany*, commemorates John Robin, botanist to Henry IV. and Louis XIII. of France, who published a catalogue of his own garden, which has gone through several editions. He also supplied descriptions to Valler's figures. A popular French author, who calls himself M. de Vigneul-Marville, but whose real name was d'Argonne, in his *Melanges*, stigmatizes Robin for his greedy and selfish love of flowers, the more curious kinds of which he would rather destroy, than communicate to his friends. In allusion to this, and to a report of his being an eunuch, he was addressed in a bitter Latin satire, as by nature an enemy to all propagation. De Theis, nevertheless, speaks of Vespasian Robin as his son. They published conjointly a botanical *Enchiridion*, or manual, and one of them introduced into the French gardens, from American seeds, that species of *Robinia* called *Pseudo-acacia* by Tournefort, who under that name founded the present genus.—Linn. Gen. 378. Schreb. 501. Willd. Sp. Pl. v. 3. 1131. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 323. Pursh v. 2. 487. Juss. 358. Lamarck Illustr. t. 606. Gærtn. t. 145. (*Pseudoacacia*; Tourn. t. 417. Caragana; Lamarck Dict. v. 1. 615. Illustr. t. 607. Juss. 358.)—Class and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceae*, Linn. *Leguminosae*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, small, bell-shaped, four-cleft; the three lower teeth narrow; the upper one twice as broad, with a broad shallow sinus; all of equal length. *Cor.* papilionaceous. Standard roundish, large, spreading, obtuse. Wings oblong-ovate, distinct, each with a very short blunt appendage. Keel nearly semiorbicular, compressed, obtuse, the length of the wings. *Stam.* Filaments diadelphous, one simple, the other nine combined, ascending towards the extremity; anthers roundish. *Pist.* Germen cylindrical, oblong; style thread shaped, bent upwards; stigma terminal. *Peric.* Legume large, long, gibbous, compressed. *Seeds* few, kidney-shaped.

Ess. Ch. *Calyx* four-cleft; the upper segment divided. Standard roundish, reflexed. Stamens in two distinct sets. Legume elongated, gibbous, of one cell, with many seeds.

Obs. Jussieu and Lamarck distinguish their genus *Caragana*, by its smooth abrupt stigma, and a somewhat cylindrical inflated legume. The former adds, that the leaves are abruptly pinnate, without the terminal leaflet seen in *Robinia*. Yet Lamarck's plates do not confirm all these distinctions. Linnæus describes the stigma as downy, and yet in his Syst. Veg. ranges *Robinia* among genera which want that character. In fact the style, rather than the stigma, is downy.

1. R. *Pseudoacacia*. Common Acacia, or Robinia. Linn. Sp. Pl. 1043. Willd. n. 1. Ait. n. 1. Pursh n. 1. "Schmidt Arb. t. 32." (*Pseudoacacia*; Duham. Arb. v. 2. 188. n. 1. t. 42.)—Partial stalks single-flowered. Leaves pinnate, with an odd leaflet. Stipulas spinous. Legumes smooth, compressed.—Native of dry fertile ridges, on the mountains of North America, from Canada to Carolina, flowering in May and June. *Pursh*. Cultivated here, by the elder Tradescant, before 1640. *Parkinson*. This is a large and handsome tree, of quick growth, beautiful in foliage, and highly ornamental, when laden in summer with bunches of white sweet-scented flowers, resembling those of the *laburnum* in size and position. The branches are liable to be shivered off by our autumnal storms. Mr. Pursh says, "the wood is almost incorruptible, and particularly calculated for posts of gates and fences." The leaves are deciduous.

ROBINIA.

deciduous, a span long, of a peculiarly pleasant light green, consisting of many elliptical, opposite or alternate, stalked leaflets. The short awl-shaped *stipulas* become rigid spines. *Legumes* pale, wavy, compressed, two or three inches long.

2. *R. viscosa*. Clammy Robinia. Willd. n. 2. Ait. n. 2. Pursh n. 2. Venten. Jard. de Cels, t. 4. (*R. glutinosa*; Curt. Mag. t. 560. *R. Pseudoacacia* var. Sm. in Abbot's Inf. of Georgia, v. 1. 37. t. 19.)—Partial stalks single-flowered. Leaves pinnate, with an odd leaflet. Branches and legumes clothed with viscid glands.—Native of the banks of rivers in South Carolina, especially the Savannah, flowering in June and July; and said to have been introduced into our gardens, where it is quite hardy, by Mr. R. Whitley, in 1797. This species not being known to us when Abbot's Infests of Georgia were published, was, in that work, mistaken for a red-flowered variety of the foregoing. The whole tree is of a smaller size than that species, and distinguished by its dark red viscid branches. The flowers are variegated with pink and white. *Stipulas* forming straighter spines. The creeping roots are said, by Mr. Pursh, to be troublesome in small plantations. Hence, however, our gardeners propagate the tree the more easily by cuttings of the root, instead of grafting this species on the more brittle *Pseudoacacia*.

3. *R. violacea*. Violet Robinia. Linn. Sp. Pl. 1044. Willd. n. 3. Ait. n. 3. Jacq. Amer. 210. t. 177. f. 49.—Partial stalks two-flowered. Calyx but slightly toothed. Leaves pinnate, with an odd leaflet. Branches without thorns.—Found by Jacquin in bushy places about Carthage in South America, flowering in July and August. Miller cultivated this plant, but it is now unknown in our stoves. Jacquin describes it about twelve feet high, erect, with shining leaves, whose leaflets are about six pair, stalked, ovate, obtuse, emarginate, two inches long. Clusters axillary, half a foot in length; their partial stalks short, numerous, each bearing two flowers, which resemble our sweet violet in scent as well as colour.

4. *R. striata*. Striated-leaved Robinia. Willd. n. 4.—“Partial stalks single-flowered. Leaves pinnate, with an odd leaflet; downy beneath. Branches without thorns.”—Gathered by Bredemeyer, on open sunny hills in the Caraccas. A large shrub, with pale, unarmed, warty branches. Leaves half a foot long, composed of from fifteen to twenty-five oblong, pointed leaflets, each an inch in length, striated with veins; shining above; covered with close-pressed hairs beneath. *Stipulas* lanceolate, deciduous. Clusters simple, shorter than the leaves, downy, as well as the calyx. Bractees awl-shaped, very short. Corolla yellow, Willdenow.

5. *R. hispida*. Hairy Robinia, or Rose Acacia. Linn. Mant. 101; excluding the reference to Jacquin. Willd. n. 5. Ait. n. 4. Pursh n. 3. Curt. Mag. t. 311. (*R. foliis impari-pinnatis; foliolis ovatis, ramis pedunculisque hispidis*; Mill. Ic. 163. t. 244. *Pseudoacacia hispida, floribus roseis*; Catesb. Carol. v. 3. 20. t. 20.)—Branches, calyx, and flower-stalks hispid. Thorns none. Leaves pinnate, with an odd leaflet. Partial stalks single-flowered.—Native of mountains in Virginia and Carolina. Hardy with us, flowering from May to September, being a very ornamental shrub, on account of its large pink copious blossoms, enhanced, like a moss rose, by the brown brittle covering of the stalks and calyx. Pursh notices a taller and less hispid variety.

6. *R. sepium*. Hedge Robinia. Willd. n. 6. Jacq. Amer. 221. t. 179. f. 101. Swartz Ind. Occ. v. 3. 1258.—Partial stalks mostly two-flowered. Leaves pinnate, with

an odd leaflet, pointed. Thorns none.—Native of the banks of rivers, in the recesses of mountains of the West Indies, flowering about March and April. A tree twenty or thirty feet high, with long, lax, spreading branches. The leaflets differ from those of *violacea*, n. 3, in being pointed, not emarginate. Clusters rather drooping, of numerous purple flowers; their stalks smooth.

7. *R. squamata*. Scaly-branched Robinia. Willd. n. 7. “Vahl Symb. v. 3. 88. t. 69.”—Partial stalks single-flowered. Leaves pinnate, with an odd leaflet, spinous-pointed. *Stipulas* spinous.—Native of the island of St. Thomas. Branches round, smooth, leafy towards the ends, scaly below the leaves; bearing smaller ones scarcely an inch long, clothed with four rows of imbricated, ovate, pointed scales. Leaflets about nine pair, oval or roundish, smooth and shining on both sides, the midrib of each extended into a terminal spine. *Stipulas* permanent, hardening into thorns. Clusters axillary, downy, of four or five distant flowers. Bractees small, linear. Calyx smooth, with lanceolate segments. Legume compressed, linear, occasionally contracted here and there, as if jointed.

8. *R. uliginosa*. Swamp Robinia. Willd. n. 8.—“Partial stalks three-flowered. Leaves ternate, oblong, pointed. Branches twining, without thorns.”—Native of the East Indies; communicated to Willdenow by Dr. Roxburgh. The branches are described as round and smooth. Leaflets an inch and half long, pointed, smooth. Clusters from the old branches, three inches in length. Flowers apparently white.

9. *R. scandens*. Climbing Robinia. Willd. n. 9. (*R. Nicou*; Aubl. Guian. v. 2. 771. t. 308.)—Partial stalks single-flowered. Leaves pinnate, with an odd leaflet, oval, pointed, smooth. Branches twining, without thorns.—Native of the woods of Guiana, flowering in June. A twining shrub, of lofty growth, crowning the neighbouring trees with its leafy branches, and purple blossoms. The leaflets are usually seven, each about four inches long. Flowers in axillary clusters. Legume compressed, thick-edged, smooth, measuring about two inches. The natives of Guiana beat the water with fresh cut twigs of this shrub, by which means the fish are intoxicated, and floating insensible near the surface, are easily caught.

10. *R. tomentosa*. Downy Robinia. Willd. n. 10. (*R. Panacoco*; Aubl. Guian. v. 2. 768. t. 307.)—Partial stalks single-flowered. Leaves pinnate, with an odd leaflet, elliptical, pointed, coriaceous; somewhat downy beneath: their common stalk rough. Stem arboreous, without thorns.—Found by Aublet in the woods of Cayenne and Guiana, being one of the largest trees of those countries. The trunk is 60 feet or upwards in height, and usually a yard in diameter; its base subdivided above ground, so as to form cavities six or eight feet wide, affording shelter to wild beasts. The head consists of strong and widely extended branches, which when young are clothed, like the main stalks of the leaves, with red or rusty down. The leaflets are from eleven to fourteen, various in size, from three to eight inches long, veiny and wrinkled; smooth above; more or less hairy or downy beneath. *Stipulas* deciduous. Clusters at the ends of the branches. Flowers reddish. Legume two inches long, half-lanceolate. The bark of the tree, when wounded, distils a copious resinous balsam. The wood is almost incorruptible, Aublet having observed posts, partly in the ground, which were quite found, though said to be above 60 years old.

11. *R. florida*. Flowery Robinia. Willd. n. 11. “Vahl. Symb. v. 3. 89. t. 70.”—Stalks simple, single-flowered. Leaves abruptly pinnate, smooth; their common

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stalks unarmed. Stipulas lanceolate, permanent, flexible. Calyx nearly entire.—Native of the West Indies. A very beautiful *shrub*, entirely covered with large purplish flowers, four or five from each bud, on simple capillary stalks, before the leaves appear. Branches round, smooth, dotted, purplish-grey. Lower leaves from the flowering buds of the preceding year, usually two or three together, the length of the finger; upper ones on the young branches solitary, alternate, half as long again; leaflets stalked, opposite, oblong, smooth, veiny, pointed, the uppermost rather smallest: common footstalk without any terminal spine. Stipulas lanceolate, small, thin, flexible, permanent. Calyx cup-shaped, nearly entire, finely downy. Corolla large; its claws the length of the calyx. Germen smooth. Vahl.

12. *R. polyantha*. Many-flowered Robinia. Swartz Ind. Occ. v. 3. 1260.—Stalks simple, single-flowered. Leaves abruptly pinnate; hoary beneath; their common stalks unarmed. Stipulas awl-shaped, close-pressed, permanent. Calyx with linear teeth.—Native of thickets on the mountains of Hispaniola. A *shrub*, about six feet high, erect, with copious branches, destitute of dots; greyish and downy when young. Flowers pale purple, three or four from each bud, appearing mostly before the leaves, as in the last, from which this species chiefly differs in the smaller size of every part, and in the teeth of its calyx, which are nearly, if not entirely, wanting in *R. florida*. Swartz.

13. *R. Caragana*. Caragana Robinia, or Siberian Pea-tree. Linn. Sp. Pl. 1044. Willd. n. 12. Ait. n. 5. "Schmidt Arb. t. 33." (R. Altagana; Pall. Ross. v. 1. p. 1. 68. t. 42, the middle figure only.)—Stalks simple, single-flowered, many together. Leaves abruptly pinnate, of about four pair of elliptical leaflets; their common stalks unarmed. Stipulas thorny. Legume cylindrical.—Native of Siberia. Cultivated by Miller in 1752. Hardy in our gardens, flowering in April and May. The stem forms a bushy *shrub*, producing from each bud numerous large yellow flowers, on long simple stalks, accompanied by several abruptly pinnated, nearly smooth, leaves, which become alternate on the protruding branches. The leaflets are mostly alternate, elliptical or obovate, hardly an inch long. The stipulas change into straight awl-shaped thorns.

14. *R. Altagana*. Sand Robinia. Willd. n. 13. Ait. n. 6. L'Herit. Stirp. 159. t. 76. Pall. Ross. v. 1. p. 1. 69, the small variety, t. 42, the lateral figures.—Stalks simple, single-flowered, solitary. Leaves abruptly pinnate, of about eight pair of obovate, or inversely heart-shaped, leaflets; their common stalks unarmed. Stipulas thorny. Legume compressed.—Native of sandy ground in Siberia. Introduced into England by Mr. Bell, in 1789. Differs from the last, of which Pallas made it a variety, in its more humble size, emarginate, numerous, and hoary leaflets; solitary flowers; and especially its compressed legume. These two species, so nearly akin, prove the supposed generic distinction of the cylindrical and compressed legumes, asserted by Lamarck to be of no avail, in a natural point of view, for the purpose of dividing Robinia into two genera.

15. *R. jubata*. Bearded Robinia. Willd. n. 14. Ait. n. 7. "Pall. in Nov. Act. Petrop. v. 10. 370. t. 6."—Stalks simple, single-flowered. Leaves abruptly pinnate, of numerous pairs of lanceolate, downy leaflets; their common stalks thread-shaped, spinous, permanent, reflexed. Branches villous.—Found near lake Baical in Siberia, from whence it was imported by Mr. Bush, in 1796. This is a small *shrub*, scarcely two feet high, with villous branches, assuming a very peculiar aspect in consequence of its numerous, reflexed, permanent, hardened and spinous common

footstalks. The leaflets are narrow. Flowers purplish. Legumes cylindrical, hard, reddish-brown.

16. *R. tragacanthoides*. Tragacanthine Robinia. Willd. n. 15. "Pall. in Nov. Act. Petrop. v. 10. 371. t. 7."—Stalks simple, single-flowered. Leaves abruptly pinnate, of two pair of oblong-lanceolate, silky leaflets; their common stalks spinous and permanent, as well as the stipulas. Legume downy, somewhat compressed.—Native of granite rocks in Siberia, beyond lake Baical. A small *shrub*, very much branched. Branches downy, armed with strong, recurved, stipulaceous spines. Leaflets small, tapering at each end, tipped with terminal, solitary thorn. Flowers yellow. Legume cylindrical, slightly compressed. Willd.

17. *R. spinosa*. Thorny Robinia. Linn. Mant. 269. Willd. n. 16. Ait. n. 8. "Schmidt Arb. t. 36." (R. ferox; Pall. Ross. v. 1. p. 1. 70. t. 44.)—Stalks single-flowered, very short. Leaves abruptly pinnate, of about three pair of wedge-shaped smooth leaflets; their common stalks spinous and permanent, as well as the stipulas. Legume cylindrical. Native of moist gravelly vallies, as well as of dry sandy hills, in Siberia. Hardy in our gardens, flowering in April and May. Pallas reports, that it is frequent about Pekin in China, where, being fixed with clay on the tops of walls, it serves to keep off intruders. The long strong thorns, formed by the hardened footstalks, render the bushes of this species excellent for hedges. The stems are as tall as a man, much branched. Leaflets oblong-wedge-shaped, hardly an inch in length. Flowers yellow, axillary, either solitary or two or three together, each on a simple stalk not half the length of its calyx.

18. *R. Halodendron*. Salt-tree Robinia. Pall. It. v. 2. append. 741. t. W. Ross. v. 1. p. 1. 72. t. 46. Linn. Suppl. 330. Willd. n. 17. Ait. n. 9. Curt. Mag. t. 1016.—Stalks three-flowered. Leaves abruptly pinnate, of two pair of silky leaflets; their common stalks spinous and permanent. Legume inflated.—Found by Pallas, in dry salt fields, about the river Irtis, in Siberia. The late Dr. Pitcairn is mentioned as having first imported it in 1779. This *shrub* is hardy with us, but seldom blossoms, which is much to be regretted on account of its beauty. Its thorny habit nearly accords with the foregoing; but the leaflets are fewer, larger, and silky, of a glaucous hue. Corolla of a delicate rose-colour. Legume ovate, inflated, an inch long, scarcely less different from the Caragana tribe, than from the original Robinia; yet no person who attends to natural genera could think of separating this plant from the last.

19. *R. Chamlagu*. Shining Robinia. L'Herit. Stirp. 161. t. 77. Willd. n. 18. Ait. n. 10.—Stalks single-flowered. Leaves abruptly pinnate, of two pair of obovate smooth leaflets; their common stalks spinous. Stipulas awl-shaped, spinous, permanent. Branches decumbent.—Supposed to be a native of China. It has long been cultivated in the French gardens, and was sent to Kew, in 1773, by Mons. Richard. The shrub is hardy, flowering in May and June. The stem, at first erect, throws out long decumbent branches. Leaves green, smooth and shining; each leaflet tipped with a small brittle point. Flowers large, on long, solitary, simple stalks, pendulous, yellow; the disk of their standard at first green, afterwards deep red. The young legume is cylindrical, but we have never seen it full-grown. The footstalks, though spinous, are less hard and permanent than in many of the other species.

20. *R. frutescens*. Bush Robinia. Linn. Sp. Pl. 1044. Willd. n. 19. Ait. n. 11. Pall. Ross. v. 1. p. 1. 69. t. 43.—Stalks single-flowered. Leaves of four, obovate, smooth, brittle-pointed, equal-stalked leaflets. Branches ascending.—Native of hills in the temperate parts of Siberia. Cultivated

vated by Miller in 1752; flowering in the spring. The stem is branched, bushy, and erect, various in height, from two to eight or nine feet. Leaves different from all the foregoing, consisting of four, nearly equal, obovate leaflets, each on its own short partial stalk, at the summit of a rigid, spinous-tipped, common footstalk, not a quarter the length of the leaflets. Stipulas lanceolate, oblique, combined with the common footstalk, and at length hardened with it into a three-branched divaricated spine. Flowers yellow, their simple solitary stalks longer than the leaves. The foliage varies greatly in luxuriance, according to circumstances. The legume is cylindrical.

21. *R. pygmaea*. Dwarf Robinia. Linn. Sp. Pl. 1044. Willd. n. 20. Ait. n. 12. Pall. Ross. v. 1. p. 1. 71. t. 45. (*Asphalatus frutescens minor angustifolius, cortice aureo*; Amm. Ruth. 204. t. 35.)—Stalks single-flowered. Leaves of four linear-lanceolate, spinous-pointed, nearly sessile leaflets.—Native of rocky hills in many parts of Siberia. Cultivated by Miller in 1751; flowering in the spring. This has much affinity to the last, but the narrow leaflets and their spinous points, as well as the more evident and pungent thorns of their short common footstalk and stipulas, readily distinguish it. The flowers are yellow. Leaves often more or less silky or hairy.

R. mitis, Linn. Sp. Pl. 1044, is referred by Willdenow to *Dalbergia*, under the name of *arborea*; Sp. Pl. v. 3. 901. Ait. H. Kew. v. 4. 248. This is *Pongamia glabra*, Venten. Malmaif. t. 28; an East Indian tree, of lofty growth, which has not yet blossomed in our stoves. Ventenat saw its flowers at the garden of Malmaison. The calyx is purple; petals white. Legume ovate, pointed, thick and woody.

We are not acquainted with *R. amara* and *flava* of Loureiro, Cochinch. 455, 456, nor dare we adopt them without examination.

ROBINIA, in *Gardening*, comprises plants of the hardy, deciduous, tree and shrub sorts, with tender kinds for the stove. The species cultivated are mostly these: the false or common acacia (*R. pseudo-acacia*); the rose acacia, or robinia (*R. hispida*); the Siberian abrupt-leaved robinia (*R. caragana*); the shrubby robinia (*R. frutescens*); the dwarf robinia (*R. pygmaea*); the thorny robinia (*R. spinosa*); the ash-leaved robinia (*R. violacea*); and the smooth Indian robinia (*R. mitis*).

The first sort grows very fast whilst young, so that in a few years from seed, the plants rise to eight or ten feet high, and it is not uncommon to see shoots of this tree six or eight feet long in one summer; the branches are armed with strong crooked thorns. But there is a variety which has no thorns on the branches, but which is easily known at first sight by its peculiar appearance. And the echinated, or prickly-podded American false acacia, in which the pods are much shorter, and closely beset with short prickles, but in other respects agrees with the common sort.

The sixth species, on account of the length and toughness of the branches, and its large stout thorns, is admirably adapted to form impenetrable hedges, and is sufficiently hardy to bear our climate.

Method of Culture.—The first six hardy sorts are all capable of being raised from seeds, cuttings, layers, and suckers; but the seed method is said to afford the best plants.

The seeds should be sown about the end of March or beginning of the following month, on a bed of light mould, being covered to the depth of about half an inch. In the first sort and varieties the plants mostly appear in the course of six or eight weeks; but in the other kinds often not till the

next spring. They should be well weeded and watered, and when sufficiently strong, be set out in the spring or autumn in nursery-rows, for two or three years, in order to remain, to have proper growth for final planting out. The cuttings should be made from the young shoots, and be planted out in the beginning of autumn, in a shady border, where the soil is mellow. They are mostly well rooted in the course of a twelvemonth, when they may be removed into nursery-rows as above. The layers should be made from the young wood, being laid down in the autumn, when, in the course of the year, they mostly become well rooted, and may be taken off and planted out in nursery-rows, as the seedling plants. And the suckers, which are produced in plenty from the two first sorts, may be removed in the early autumn or spring, and be planted out in nursery-rows or in beds, to be afterwards removed into them.

The two last, or tender sorts, may likewise be raised from seeds and cuttings, but they must be sown and planted in pots filled with good mould, to have the assistance of a hot-bed in the stove, by being plunged in it. When the plants have attained a little growth, they should be shaken out of the pots, and planted separately in small pots, filled with the same sort of earth, plunging them in the tan-bed, affording due shade till well rooted, managing them afterwards as other tender stove plants. And as the plants are most tender while young, they should therefore be kept in the stove tan-bed till they have acquired strength, when they may be preserved in the dry stove, with a temperate heat in winter, and be exposed in the open air in summer, in a warm sheltered situation, when the weather is fine.

It may be noticed that the hardy sorts have a fine effect in the border clumps and other parts of pleasure-grounds, and the tender kinds afford variety in the stove-collections.

ROBINS, BENJAMIN, in *Biography*, a celebrated mathematician, was born at the city of Bath in the year 1707. His parents were in very low circumstances, and utterly unable to give their son much education. His genius, however, strongly urged him to the pursuit of knowledge: he became his own instructor, and made an early and surprising progress in various branches of literature and science, particularly in the mathematics. He came to London under the patronage of Dr. Pemberton; and at the age of 20, he gave a demonstration of the last proposition of Newton's Treatise on Quadratures, which was so ably performed, that it was thought deserving a place in the Philosophical Transactions for the year 1727; and towards the close of the same year he was admitted a member of the Royal Society. In the course of the following year he embraced an opportunity of offering to the public a specimen of his acquaintance with natural philosophy. The Royal Academy of Sciences at Paris, among their prize questions in 1724 and 1726, had asked for a demonstration of the laws of motion in bodies impinging on one another. On this occasion, John Bernouilli appeared in the list of candidates, but did not obtain the reward. He felt himself aggrieved, and appealed to the learned world, by publishing his demonstration in 1727. In the following year, Mr. Robins published a confutation of Bernouilli's performance, which was allowed to be unanswerable. Mr. Robins, about this time, began to take pupils, professing to teach the mathematics only; yet he frequently assisted them with instruction and advice on other subjects, for which he was well qualified, by the rich stores of knowledge with which his mind was furnished. After some time he abandoned the laborious business of education, and devoted his attention to subjects which required more exercise. Among other things, he made many experiments in gunnery, from a belief that the

resistance of the air had a much greater effect on swift flying projectiles than was generally supposed. He likewise directed his attention to the mechanic arts, such as the construction of mills, the building of bridges, draining of fens, rendering rivers navigable, and the making of harbours. The art of fortification, likewise, very much engaged his thoughts: with this view he took pains to inspect all the principal strong places in Flanders, during some journeys which he made on the continent with persons of distinction. On his return, he undertook a defence of the doctrine of fluxions, as laid down by sir Isaac Newton, in opposition to the objections brought against it by the learned bishop Berkeley. In 1735 Mr. Robins published "A Discourse concerning the Nature and Certainty of Sir Isaac Newton's Method of Fluxions and of prime and ultimate Ratios." On the same subject he wrote two or three other pieces.

In the year 1739 he published, without his name, three pamphlets on political topics, and on the popular side of the question; and so highly did they raise the author in the estimation of the patriotic party, that when a committee of the house of commons was appointed to examine into the conduct of sir Robert Walpole, he was chosen their secretary. In 1742 Mr. Robins published a small treatise, entitled "New Principles of Gunnery;" containing the result of many experiments, by which he discovered the force of gunpowder, and the difference in the resisting power of the air to swift and slow motions. From which it appeared, that the opposition of that medium to bullets and shells, discharged from cannon and mortars, far exceeded what was generally imagined; and that the track which their motion described differed from that of a parabolic line, to a degree unsuspected by any who had written expressly on the subject, from the time of Galileo. This publication was undertaken to demonstrate his own superiority, as a man of talents, over a successful competitor, Mr. Muller, for a situation in the Royal Military Academy at Woolwich. Some time after the publication of this work, a paper having been admitted into the Philosophical Transactions, containing experiments intended to invalidate some of Mr. Robins's opinions, he thought proper, in an account which he gave of his book in the same Transactions, to take some notice of those experiments. In consequence of this, several dissertations of his on the resistance of the air were read, and experiments to confirm his doctrine were exhibited before the Royal Society, in the year 1746-7; for which he was presented with the annual gold medal by that society. His reputation was now so high, that he was invited by the prince of Orange to assist in the defence of Bergen-op-Zoom, which was besieged by the French, and he actually crossed the sea with that view; but he had scarcely reached the Dutch camp, before the French, owing either to negligence or treachery in the garrison, unexpectedly became masters of the place.

In the year 1748, Anson's "Voyage round the World" was published, bearing the name of Walter in the title-page, though it was soon known to have been Mr. Robins's production. No work of the kind ever met with a more favourable reception: four large editions were sold within a year, and it has been since reprinted very frequently in all sizes. It was translated in almost all the European languages. He was next employed to draw up an apology for the unfortunate defeat of the king's troops by the rebels, at Preston-Pans in Scotland, which was prefixed to "The Report of the Proceedings and Opinion of the Board of General Officers, on their Examination into the Conduct of Lieutenant-General Sir John Cope," &c.

After this, Mr. Robins had opportunities, through the favour of lord Anson, of making further experiments in gunnery; an account of which, with other pieces, were published after his death. Through the interest of the same nobleman, he contributed to the improvement of the Royal Observatory of Greenwich, by procuring for it many valuable instruments. In the year 1749 he was made engineer-general to the East India Company; and with a complete set of astronomical instruments, for making observations and experiments, he arrived in India in the summer of 1750. He set about the business which he had undertaken immediately, with the utmost diligence, and soon formed plans for fort St. David and Madras; but he did not live to carry them into execution. The change of climate was more than he could endure, and he died at the early age of 44, in July 1751.

Mr. Robins was one of the most accurate and elegant mathematical writers of this country, and he made more real improvements in artillery, and on subjects relating to the resistance of the air to projectiles, than all the preceding authors on the subject. His "New Principles of Gunnery" were translated into various languages, and commented upon by several eminent mathematicians. Euler translated it into the German, and accompanied the version with a large and critical commentary. This again was published in England, with an English translation of the German commentary and notes, by Mr. Hugh Brown, in 1777. All Mr. Robins's mathematical and philosophical pieces were collected, and published in 2 vols. 8vo. 1761, by Dr. Wilson, with an account of the author, from which the foregoing article is chiefly extracted.

ROBINSON, ROBERT, born in October 1735, at Swaffham, in the county of Norfolk, was son of Mr. Michael Robinson, a native of North Britain, and Mary, the daughter of Mr. Robert Wilkin of Mildenhall, Suffolk, a man of great respectability in private life, and in possession of a moderate independence. Robert was the youngest of their three children: his elder brother was apprenticed to a painter, and his sister to a mantua-maker; he was sent to a Latin school at the age of six years, where he made a considerable proficiency, and discovered an uncommon capacity for learning. His father, in the course of his profession, was removed from Swaffham to Scarning, in the same county, where finding his situation very unpleasant, he left the place, his family returning home, and he shortly after died at Winchester. At Scarning young Robinson was sent to an endowed grammar-school, then under the care of the Rev. Joseph Brett. Several persons of eminence received the early parts of their education at the same school, among whom was the late lord Thurlow. At this school he gained a considerable knowledge of the French, as well as of the classical languages. At the age of 14 he was put apprentice to a hair-dresser, in Crutched-Friars, London. For this occupation his mind was very ill adapted, and he stole from the hours devoted to sleep no small portion of time for the improvement of his mind. During his apprenticeship he appears to have imbibed serious impressions of religion, which he encouraged, by attending the most celebrated preachers of the day among the Independents, the Baptists, and the clergy falsely named evangelical; for they dwell, in their pulpit discourses, upon all sorts of subjects, excepting only those contained in the four gospels. Dr. Guise and Gill among the dissenters, Romaine in the church, and Whitfield, the leader of the Calvinistical Methodists, were his chief favourites. At this period Robert Robinson had a considerable portion of enthusiasm in his constitution, which is not an undesirable quality in young people

people left much to themselves, and liable to a thousand temptations in corrupt and licentious cities and large towns. It is often the best preservative of their morals, and will frequently grow into rational and energetic modes of thinking and acting.

About the age of 20, Robert Robinson had his indentures given him up, at his own request, feeling a great desire to become a preacher. He had, previously to this, been in the habit of preaching for the hour together to himself, thinking that he should thereby be better prepared to address an audience assembled to hear his discourses. His first sermon was delivered to a very small congregation at Mil-denhall, in Suffolk; and his reception was such as to justify the hope that he had taken that direction to which his talents naturally tended. He was soon after invited to preach at the Tabernacle in Norwich, and at several places in Norfolk and Cambridgeshire. He continued to preach among the Methodists two years, during which period he appears to have turned his attention more particularly to the controversy between the members of the established church and the dissenters, and to have determined, upon the fullest conviction, to take his lot with the latter. He had, however, according to Dr. Rees, who preached his funeral sermon, a temptation to connect himself with the former, too powerful for any but a man of Christian integrity to resist. "A rich relation," says the doctor, "who had promised to provide liberally for him, and who had bequeathed him a considerable sum of money in his will, threatened to deprive him of every advantage which he had been encouraged to expect, unless he quitted his connection with the dissenters. But the rights of conscience, and the approbation of God, were superior in his regard to every worldly consideration: he preserved his integrity, steadily maintained his principles, and persevered in his connection with the dissenters; but forfeited the favour of his relation, and every advantage which, living or dying, he had in his power to bestow."

He now attempted to incorporate the Methodists, among whom he ministered, into a regular church; but proving unsuccessful, he determined to separate from them. Having done so, he formed a small *Independent* congregation at Norwich, and during his connection with them, he administered infant baptism; but on leaving this congregation, he renounced infant baptism, and administered this ordinance only to adults, and by immersion.

In the spring of 1759 he was invited to preach to a small congregation of Antepædobaptists at Cambridge. About the same time he married Miss Ellen Payne; and in 1761 he accepted the pastoral office in this church. When Mr. Robinson first settled with this society, it consisted only of 34 members, most of whom were very poor, so that he could look only for a salary of a few pounds at most; but it increased rapidly under him, and in a few years he had the satisfaction of seeing a new and more commodious place of worship, erected at the sole expence of the congregation; and in 1774, the number of families connected with it was not less than 200, many of whom ranked among the most respectable in the town and neighbourhood. Mr. Robinson preached twice or thrice on each Sunday, and usually once on some other day in the week, at Cambridge. On some of the other mornings and evenings in the week, excepting in times of hay and corn-harvest, he expounded the scriptures, or delivered religious and moral lectures, in the village where he lived, or in the neighbouring villages. To young persons he rendered essential service, by delivering lectures to them at his own house, or by private conversation. These various employments of his time he rendered consistent with his other numerous engagements, and close

application to study, by the excellent habit which he had acquired, when young, of rising early in the morning, *viz.* at four or five o'clock; a practice that ought to be recommended to every student. "I wish," says the late Gilbert Wakefield, speaking on the same subject, "my advice and imperfect experience of its benefits could persuade every youth to engrave it, in impressions not to be effaced, on the tablet of his heart, and exemplify it in his daily practice."

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Potes ante diem librum cum lumine; si non
Intendes animum studiis et rebus honestis,
Invidiâ vel amore vigil torquere."

"Rise, light thy candle, see thy task begun,
E'er redd'ning streaks proclaim the distant sun;
Or lust's fierce whirlwind will thy calm molest,
Or envy cloud the sunshine of thy breast."

Soon after the opening of the new meeting-house, the abilities of Mr. Robinson as a preacher began to attract the notice of the academics, many of whom, from serious motives, became regular attendants; while others came to meeting only to indulge their curiosity, or perhaps to ridicule the minister. Of the latter description were several under-graduates, who frequently disturbed the devotion of the congregation by an indecency of behaviour. Complaints of their conduct had been repeatedly made to the magistrates of the university, and the heads of the colleges, but without procuring redress. At length the rudeness of these young men required measures to be taken, which should no longer be treated with contempt. A legal process was begun, which induced two of the worst offenders to agree to ask pardon in the public papers. The persons aggrieved, however, remitted this punishment in the case of one of the delinquents, on account of his otherwise excellent character. The evil was, by this measure, well nigh cured, and Mr. Robinson had little or no reason to complain afterwards of interruption from that quarter. From this period, many of the most respectable members of the university solicited his acquaintance, and entertained a due respect for his worth, however they differed from him in opinion; and through their aid and influence, he obtained freedom and access to the valuable libraries at Cambridge, and was permitted, in many cases, the more important privilege of having books from them at his own house.

In the year 1773, Mr. Robinson's family having become so numerous that his salary as a minister was found inadequate to his support, he found it necessary to have recourse to other means for making a provision for them. He accordingly removed to Cherterton, near Cambridge, and commenced farmer, to which, in time, he added the business of a dealer in corn and coals. His farming and mercantile engagements, however, did not diminish his ardour for literary pursuits, as is evident from his various publications. The first work which contributed to make him known as an author, was published in 1774, under the title of "Arcana," or the Principles of the late Petitioners to Parliament for relief in Matters of Subscription, in eight letters to a friend. The reception which this piece met with was extremely encouraging: it procured the author many valuable friends among the dissenters. His next publication was an "Appendix" to "The Legal Degrees of Marriage, stated and considered by John Alleyne, Barrister at Law," 2d edition, 1775. It consists of a discussion of the question, "Is it lawful and right for a man to marry the sister of his deceased wife?" in which he maintained, in a

very

very forcible manner, the affirmative side of the question. In the same year he published an entire volume of "Sermons, from the original French of the late Rev. James Saurin, Pastor of the French Church at the Hague," which was followed, at different periods, by four others. Introductory to these volumes are prefatory dissertations, containing interesting memoirs of the Reformation in France, and the life of Saurin, together with reflections on Deism, Christian liberty, &c. The fame which Mr. Robinson acquired by this publication, induced certain divines, and among them dignitaries of the established church, to offer him liberal terms for original sermons for their own use.

In the year 1776, the controversy respecting the divinity of Christ, which had been carried on principally by members of the church of England, some of whom had resigned their livings, much engaged the public attention. Mr. Robinson appeared on the popular side of the question, and published "A Plea for the Divinity of our Lord Jesus Christ, &c." This piece is written with much ingenuity, and it procured the author a number of handsome compliments, not only from dissenting ministers, but also from several dignitaries of the established church. Among the latter were Dr. Hinchliffe, bishop of Peterborough, Dr. Hallifax, afterwards bishop of Gloucester, Dr. Beadon, afterwards bishop of Bath and Wells, and Dr. Tucker, dean of Gloucester. Some years after, Mr. Lindsey published, without his name, "An Examination of Mr. Robinson's Plea for the Divinity of Christ;" in a second edition, in 1789, Mr. Lindsey prefixed his name. Mr. Robinson was frequently called upon to reply to Mr. Lindsey, but he declined. To his friends he said, "The anonymous examiner has not touched my arguments, and his spirit is bitter and contemptuous. His faith stands on criticisms; and my argument is, that if the doctrine requires critical proof, it is not popular, and therefore not divine." In 1777, Mr. Robinson published a small tract, entitled "The History and Mystery of Good Friday," that has passed through numerous large editions, and in which the evil and folly of church holidays is with equal humour, learning, and argument, unanswerably demonstrated. In 1778, Mr. Robinson published "A Plan of Lectures on the Principles of Non-conformity, for the Instruction of Catechumens." This piece contains an outline of the whole controversy of the dissenters with the church of England, and of their history, from the period of the Reformation, to the year 1773. In the house of lords it was mentioned with due respect by the earl of Shelburne; and it was ably defended in the house of commons by Mr. Fox, in opposition to an illiberal attack upon the principles of dissent, from the eloquent Mr. Burke, whose calumnies were confined to no people nor set of principles. Towards the close of the same year, Mr. Robinson published "An Essay on the Composition of a Sermon, translated from the original French of the Rev. John Claude, with Notes," in 2 vols. 8vo. The preface to the first volume of the "Essay" consists of memoirs of the life of the author.

In 1780, Mr. Robinson paid a visit to the university of Oxford, and afterwards accompanied some friends in a tour into Scotland, where he was much gratified by civilities shewn him by some of the literati of Edinburgh; and he might have received the diploma of doctor of divinity, had he not thought proper to decline that compliment. Soon after his return to Cambridge, he published a little tract well calculated to produce a Catholic spirit among his brethren of the Baptist denomination, entitled "The General Doctrine of Toleration, applied to the particular Case of Free Communion." It was about this period he

preached and published a sermon, entitled "Slavery inconsistent with the Spirit of Christianity," and he was the author of the admirable petition of the gentry, clergy, freeholders, and other inhabitants in the county of Cambridge, which was presented to the house of commons. In the year 1781, Mr. Robinson, at the desire of his brethren, began to collect materials for the History of the English Baptists. In his researches he was led to enter on a larger field than what had been originally proposed to him, and instead of confining himself to the history of English Baptists, he was induced to trace the history of baptism from the earliest use of that rite, as well as that of Baptists in all ages.

In the year 1782, Mr. Robinson published "A Political Catechism," intended to convey, in a familiar manner, just ideas of good civil government, and the British constitution. This tract was written at the time that the North administration was discarded from the councils of their sovereign for that of the marquis of Rockingham. To support the system professed by the latter—to disseminate safe political principles—to place public happiness on its true basis, were the motives which induced Mr. Robinson to endeavour to attract the attention of youth to this subject. This work, as well as the preface to the "Plan of Lectures," and his sermon, entitled "Christian Submission to Civil Government," afford ample evidence of the soundness of his principles as a friend to civil government in general, and to that form of civil government, the British constitution, in particular. It was in 1786 that Mr. Robinson published "Sixteen Discourses on several Texts of Scripture, addressed to Christian Assemblies, in Villages near Cambridge; to which are added Six Morning Exercises." These discourses were delivered extempore to plain and illiterate audiences, in a simple but animated style; and they were afterwards written out, from memory, by the author, as nearly as he could recollect them. They are chiefly on practical subjects; but such of them as touch on doctrinal subjects display much candour and liberality. This spirit of liberality excited serious apprehensions concerning the purity of his faith among many of his orthodox friends, who expostulated with him, both in person and by letter. Soon after this he afforded real ground for entertaining apprehensions that his faith in the gloomy doctrines of Calvinism was not so strong as in the opinion of his brethren it ought to have been. Many of them attacked him in their pulpits, endeavouring to diminish his well-earned popularity, by stigmatizing him with the names of Arian and Socinian; but others, though themselves zealously attached to those doctrines, which he seemed inclined to abandon, continued his faithful and invariable friends. With his congregation at Cambridge he still continued his ministerial labours; he had been the minister of their choice, and remained high in their esteem.

During the latter years of his life, the large field of enquiry upon which Mr. Robinson had entered, led him to such a course of intense application, as undermined the strength of his constitution, before he had given the finishing hand to his labours, and brought on a gradual decay, attended with a great depression of spirits. In these circumstances, it was hoped by his family that a journey to Birmingham, and an interview with Dr. Priestley, which he had long wished for, might prove beneficial to him. Having arrived at that town, he ventured to preach twice on the same Sunday for the benefit of the charity schools. His friends perceived that he was ill, but none of them suspected his end was so near; he spent the evening of the following Tuesday in the cheerful society of his friends,

and

and retired to rest as usual; but on the next morning he was found dead in his bed, where he appears to have expired exactly as he hoped it might be permitted him to leave the world, suddenly—and alone, without feeling the agonies of death, or occasioning alarm or distress to affectionate relatives and friends. He died June 8th, 1790, in the 55th year of his age.

Mr. Robinson was a wonderful example of a man who rose to considerable eminence by his own exertions. To his great talents and extensive learning his various writings bear the fullest testimony. He possessed an ardent love of truth, was laborious in the search after it, and at all times was a strenuous advocate for such principles as he had adopted upon deliberate conviction, while he ever exercised candour and liberality toward those whose opinions differed from his own. Of civil and religious liberty he was the enlightened, steady, and zealous friend. In his domestic relations he was attentive and affectionate; and to the poor a friend, comforter, and, as far as his limited means permitted, a generous benefactor. As a preacher, "there was always a variety, and often an originality, both in what he said, and in his mode of saying it. It was his constant aim to lead the attention of his hearers to the weightier matters of the law; to inform the judgment before he attempted to interest the passions; and, after inculcating just notions of truth and duty, to enforce a corresponding practice. There have been few preachers who have done so much to rescue the human mind from bondage; to correct prevailing errors; to promote a liberal spirit of inquiry; to recommend mutual forbearance and candour among Christians of different opinions; to weaken their attachment to creeds and forms of human device and imposition, and to direct their chief attention to the principles and duties of piety, virtue, and universal charity. He had a manner of supplanting rooted prejudices without occasioning alarm; of sapping instead of storming the fortifications of error; of gaining assent to general principles, inconsistent with the opinions which he wished to expose; and of leading men to think, judge, and determine for themselves, and to pursue these principles to their consequences, in which he wonderfully excelled, and which produced, in many instances, the best effects." See Dr. Rees's Sermon before referred to.

It has already been observed, that Mr. Robinson died before he had completed the great work to which his attention had been chiefly confined for several years. One part of his comprehensive plan, however, was finished, and the whole, excepting a few sheets, printed off, and corrected by himself while passing through the press. This was published in the year 1790, under the title of "The History of Baptism," which is one of the most acute and ingenious defences of the distinguishing tenets of the Baptists which has ever yet appeared, deduced not only from the records of history, but from the relics of Christian antiquity, being illustrated with engravings from ancient paintings and buildings, and from Danish and Saxon remains in our British churches. This part of the plan was to have been followed by a history of the Baptists, which was left in an incomplete state, but which was published in 1792, under the title of "Ecclesiastical Researches." This work was carried through the press under the superintendance of Mr. Friend, who had long enjoyed the friendship of Mr. Robinson. Besides much information which these researches contain, that is not to be found in any other English work on the subject, and the interesting views of the progress of civil and religious liberty, together with well-drawn characters of its principal advocates,

the reader will meet with a variety of important and excellent matter on other topics: the author has introduced into his narrative ingenious remarks, useful to elucidate the leading object of his inquiries, on the geography, government, laws, antiquities, commerce, productions, and customs and manners of the inhabitants of the several countries treated of. Since the death of the author, Mr. Benjamin Flower has collected all Mr. Robinson's works, with the exception of his "History of Baptism," "Ecclesiastical Researches," "Claude's Essay on the Composition of a Sermon," and his "Village Sermons," and published them in four volumes, 8vo., to which we refer our readers, who will find, by looking them over, that we have in our enumeration of Mr. Robinson's works omitted some of minor importance. And in the year 1812, the same person published certain posthumous pieces of our author in one volume octavo: these, on the whole, cannot be said to add to the reputation of Mr. Robinson; they consist of seven sermons, and three dissertations, "On the Nature and Operations of the Human Mind, as relating more particularly to Theological Inquiries;" "Literary Precautions necessary to the Study of Theology;" "On Predestination; or, Moderate Calvinism considered as the safe Path between Two Extremes." To these tracts are added "An Historical Account of Protestant Dissenting Churches in Cambridgeshire," and divers of Mr. Robinson's letters. See Dr. Rees's Sermon on the Death of Mr. Robinson; Dyer's Life of Robinson, 1796; and Flower's Memoirs, prefixed to the first vol. of the Miscellaneous Works, 1807.

ROBINSON, RICHARD, archbishop of Armagh, and baron Rokeby, was born in 1709. He was educated at Westminster school, from whence he was elected to Christ-church, Oxford, after which he became chaplain to archbishop Blackburne, of York, who gave him a prebend in his cathedral. He went with the duke of Dorset to Ireland, and was preferred to the see of Killala, from whence, in 1759, he was translated to Leighlin and Ferns, and in 1761 to Kildare. In 1765 he was advanced to the primacy of Ireland, and in 1777 he was created a peer. He built a palace in his diocese of Armagh, with an observatory. (See the article OBSERVATORY.) He also founded a school, and built four new churches. He died in 1794. Europ. Mag.

ROBINSON, JOHN, organist of St. Laurence Jewry, of St. Magnus church, and of Westminster abbey. He was regarded as one of the best performers on keyed instruments of his time. As an organ-player he was attended by great crowds wherever he performed. He was educated in the chapel-royal, under Dr. Blow. His wife was the daughter of Dr. William Turner, and a public singer. She performed in Scarlatti's opera of Narcissus, brought on the stage by Roscigrave, in 1720; and to distinguish her from Mrs. Anastasia Robinson, who sung in the same opera, she was called Mrs. Turner Robinson. This celebrated organist died at an advanced age in 1762, and was succeeded, in Westminster abbey, by Dr. Benjamin Cook.

ROBINSON, M^{rs}, daughter of the celebrated organist of Westminster abbey, who sung at concerts, and, one season, in Handel's oratorios. She was a coarse singer, with an unpleasant toned voice; but that did not prevent her from becoming a great player on the harpsichord; particularly on a harpsichord made by Rucker, with pedals, of which she had acquired, by labour and perseverance, a facility of execution equal to German organists. The result, however, was not equal to the great difficulty of using them. The pedals of an organ often produce fine effects in sustaining notes with the feet, while both hands are at liberty to ramble

about in the treble at their pleasure. But on a harpsichord with pedals to short-lived sounds, the clatter of striking them so often is abominable; it is not music, but noise.

ROBINSON, *Mrs. ANASTASIA*, a most amiable and accomplished person, who performed as a singer in our first Italian operas, from the year 1714 to 1724. This performer, descended from a good family in Leicestershire, was the daughter of a portrait painter, who, having visited Italy for improvement in his art, had made himself master of the Italian language, and acquired a good taste in music. And finding that his daughter Anastasia, during her childhood, had an ear for music, and a promising voice, he had her taught by Dr. Crofts, at first as an accomplishment; but afterwards being afflicted with a disorder in his eyes, which terminated in a total loss of sight; and this misfortune depriving him of the means of supporting himself and family by his pencil, he was under the necessity of availing himself of his daughter's disposition for music, to turn it to account as a profession. She not only prosecuted her musical studies with great diligence, but by the assistance of her father had acquired such a knowledge in the Italian tongue as enabled her to converse in that language, and to read the best poets in it with facility. And that her taste in singing might approach nearer to that of the natives of Italy, she had vocal instructions from Sandoni, at that time an eminent Italian singing master resident in London, and likewise from the opera singer called the Baroness.

Her first public exhibition was at the concerts in York-buildings, and at other places, where she usually accompanied herself on the harpsichord. Her general education had been pursued with the utmost care and attention to the improvement of her mind, as well as to ornamental and external accomplishments; and these advantages, seconded by her own disposition and amiable qualities, rendered her conduct strictly prudent and irreproachable. And what still entitled her to general favour, was a behaviour full of timidity and respect to her superiors, and an undissembled gentleness and affability to others, which, with a native cheerfulness that diffused itself to all around her, gained her at all times such a reception from the public, as seemed to ensure her success in whatever she should undertake. Encouraged by the partiality of the public towards his daughter, and particularly by the countenance and patronage of some persons of high rank of her own sex, Mr. Robinson took a house in Golden-square, where he established weekly concerts and assemblies in the manner of *conversazioni*, which were frequented by all such as had any pretensions to politeness and good taste.

Thus qualified and encouraged, she was prevailed upon to accept of an engagement at the Opera, where she made her first appearance in Crespo, and her second in the character of Imina, the principal female part in Arminio. From this period till the year 1724, she continued to perform a principal part at the Opera with increasing favour and applause. Her salary is said to have been 1000*l.*, and her emoluments, by benefits and presents, were estimated at nearly as much more. When she quitted the stage it was supposed to have been in consequence of her marriage with the gallant earl of Peterborough, the friend of Pope and Swift, who distinguished himself so heroically in Spain during the reign of queen Anne. Though the marriage was not publicly declared till the earl's death in 1735, yet it was then spoken of as an event which had long taken place. And such was the purity of her conduct and character, that she was instantly visited at Fulham as the lady of the mansion, by persons of the highest rank. Here, and at Mount Bevis, the earl's seat near Southampton, she resided in an

exalted station till the year of her decease, 1750, surviving her lord fifteen years; who, at the time of the connexion, must have been considerably beyond his prime, as he was arrived at his seventy-fifth year when he died.

The following anecdotes of Mrs. Anastasia Robinson having been communicated to us in 1787, by the late venerable Mrs. Delany, her contemporary and intimate acquaintance, they will doubtless be read with confidence and pleasure, not only by such as had the happiness of knowing her personally, but by all those to whom rumour has conveyed a faithful account of her longevity, virtues, and accomplishments; for this excellent person having been allowed by Providence to extend her existence to the great age of eighty-eight, in the constant enjoyment of all the felicity which the friendship and admiration of rank, virtue, and talents could bestow; it seems as if, without hyperbole, she may be said to have been "beloved by God and man."

"Mrs. Anastasia Robinson was of a middling stature, not handsome, but of a pleasing, modest countenance, with large blue eyes. Her deportment was easy, unaffected, and graceful. Her manner and address very engaging; and her behaviour, on all occasions, that of a gentlewoman, with perfect propriety. She was not only liked by all her acquaintance, but loved and caressed by persons of the highest rank, with whom she appeared always equal, without assuming. Her father's house, in Golden-square, was frequented by all the men of genius and refined taste of the times; among the number of persons of distinction who frequented Mr. Robinson's house, and seemed to distinguish his daughter in a particular manner, were the earl of Peterborough and general H—; the latter had shewn a long attachment to her, and his attentions were so remarkable, that they seemed more than the effects of common politeness; and as he was a very agreeable man, and in good circumstances, he was favourably received, not doubting but that his intentions were honourable. A declaration of a very contrary nature was treated with the contempt it deserved, though Mrs. A. Robinson was very much prepossessed in his favour.

"Soon after this, lord P. endeavoured to convince her of his partial regard for her; but, agreeable and artful as he was, she remained very much upon her guard, which rather increased than diminished his admiration and passion for her. Yet still his pride struggled with his inclination; for all this time she was engaged to sing in public, a circumstance very grievous to her, but urged by the best of motives, she submitted to it, in order to assist her parents, whose fortune was much reduced by Mr. Robinson's loss of sight, which deprived him of the benefit of his profession as a painter.

"At length lord P. made his declaration to her on honourable terms; he found it would be vain to make proposals on any other; and as he omitted no circumstance that could engage her esteem and gratitude, she accepted them, as she was sincerely attached to him. He earnestly requested her keeping it a secret till it was a more convenient time for him to make it known, to which she readily consented, having a perfect confidence in his honour. Among the persons of distinction that professed a friendship for Mrs. A. Robinson, were the earl and countess of Oxford, daughter-in-law to the lord-treasurer Oxford, who not only bore every public testimony of their affection and esteem for Mrs. A. Robinson, but lady Oxford attended her when she was privately married to the earl of P., and lady P. ever acknowledged her obligations with the warmest gratitude; and after lady Oxford's death, she was particularly distinguished by the duchess of Portland, lady Oxford's daughter, and

and was always mentioned by her with the greatest kindness for the many friendly offices she used to do her in her childhood when in lady Oxford's family, which made a lasting impression upon the dukes of Portland's noble and generous heart.

"Mrs. A. Robinson had one sister, a very pretty accomplished woman, who married Dr. Arbuthnot's brother. After the death of Mr. Robinson, lord P. took a house near Fulham, in the neighbourhood of his own villa at Parson's-Green, where he settled Mrs. Robinson and her mother. They never lived under the same roof, till the earl, being seized with a violent fit of illness, solicited her to attend him at Mount Bevis, near Southampton, which she refused with firmness, but upon condition that, though still denied to take his name, she might be permitted to wear her wedding ring; to which, finding her inexorable, he at length consented.

"His haughty spirit was still reluctant to the making a declaration, that would have done justice to so worthy a character as the person to whom he was now united; and, indeed, his uncontrollable temper, and high opinion of his own actions, made him a very awful husband, ill suited to lady P.—'s good sense, amiable temper, and delicate sentiments. She was a Roman Catholic, but never gave offence to those of a contrary opinion, though very strict in what she thought her duty. Her excellent principles and fortitude of mind supported her through many severe trials in her conjugal state. But at last he prevailed on himself to do her justice, instigated, it is supposed, by his bad state of health, which obliged him to seek another climate, and she absolutely refused to go with him unless he declared his marriage; her attendance upon him in his illness nearly cost her her life.

"He appointed a day for all his nearest relations to meet him at the apartment over the gate-way of St. James's palace, belonging to Mr. Pointz, who was married to lord Peterborough's niece, and at that time preceptor to prince William, afterwards duke of Cumberland. Lord P. also appointed lady P. to be there at the same time; when they were all assembled he began a most eloquent oration, enumerating all the virtues and perfections of Mrs. A. Robinson, and the rectitude of her conduct during his long acquaintance with her, for which he acknowledged his great obligations and sincere attachment, declaring he was determined to do her that justice which he ought to have done long ago, which was presenting her to all his family as his wife. He spoke this harangue with so much energy, and in parts so pathetically, that lady P. not being apprised of his intentions, was so affected that she fainted away in the midst of the company.

"After lord P.—'s death she lived a very retired life, chiefly at Mount Bevis, and was seldom prevailed on to leave that habitation, but by the dukes of Portland, who was always happy to have her company at Bulstrode, when she could obtain it, and often visited her at her own house.

"Among lord P.—'s papers she found his memoirs, written by himself, in which he declared he had been guilty of such actions as would have reflected very much upon his character. For which reason she burnt them; this, however, contributed to complete the excellency of her principles, though it did not fail giving offence to the curious enquirers after anecdotes of so remarkable a character as that of the earl of Peterborough."

ROBINSON'S *Island*, in *Geography*, a small island in the Florida streams. N. lat. $24^{\circ} 43'$. W. long. $81^{\circ} 35'$.

ROBINSON *Crusoe's Coat*, in *Botany*. See CACTUS.

ROBINSONIA, was so named by Scopoli, in his *Intro-*

ductio ad historiam naturalem, in honour of one, or all, of the four Robinsons, mentioned in Haller's *Bibliotheca Botanica*. The worthy author informed us, by word of mouth, that Haller's index was his usual resource for names to his new genera; any person mentioned there being, in his opinion, sufficiently worthy of this kind of commemoration. It is pity that Robinson Crusoe was not in the list, or he might have shared a botanical crown with Cook and Bougainville. If we must seriously appropriate the above honour, it would be in favour of Dr. Tancred Robinson, a particular friend, and botanical associate, of Ray.—Schreb. 337. Willd. Sp. Pl. v. 2. 999. Mart. Mill. Dict. v. 4. (Touroulia; Aubl. Guian. v. 1. 492. Juss. 434. Lamarck Illustr. t. 424.)—Class and order, *Icosandria Monogynia*. Nat. Ord. uncertain, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, turbinate, with five acute teeth. Cor. Petals five, roundish, concave, spreading, inserted into the calyx. Stam. Filaments numerous, capillary, swelling upwards, inserted into the calyx beneath the petals; anthers of two oblong cells, divaricated at the base. Pist. Germen superior; style none; stigma oblong, striated. Peric. Berry globose, somewhat depressed, marked with numerous, contiguous, longitudinal furrows, fleshy, of seven cells, with membranous partitions. Seeds solitary, oblong, compressed, externally convex, hairy.

Ess. Ch. Calyx five-toothed. Petals five. Berry superior, striated, of seven cells. Seeds solitary, hairy.

1. *R. melianthifolia*. Willd. n. 1. (Touroulia guianensis; Aubl. Guian. v. 1. 492. t. 194.)—Found by Aublet in the forests of Guiana, where the inhabitants know it by the name of Touroulia. The flowers appear in November, and the fruit is ripened in May. A large and lofty tree, with a wrinkled bark, and red wood; the branches spreading, quadrangular. Leaves opposite, pinnate, of about four pair, with an odd one, of elliptic-oblong, pointed, smooth, serrated leaflets, whose lateral veins are numerous and parallel, and their ferratures each tipped with a bristle. Stipules acute. Clusters terminal, compound, with opposite branches. Flowers tufted, nearly sessile, yellow, small. Berry an inch in diameter, reddish, of a pleasant acid flavour. The calyx being certainly inferior, as Jussieu determined by examination, its teeth can hardly crown the fruit, though, by Aublet's description, its base seems confluent therewith.

ROBION, or ROUBION, in *Geography*, a river of France, which runs into the Rhone, a little below Montelimart.

ROBISON, JOHN, in *Biography*, an eminent Scotch mathematician and natural philosopher, was born at Boggall, in the county of Stirling, in the year 1739. He was sent to Glasgow to receive his education, and was soon distinguished for the rapid progress which he made in classical learning. He went, while very young, to the university, where he enjoyed the benefit of the instructions of professors Simson, Leechman, Moore, Smith, and others. He was led to attach himself particularly to the mathematics, by perceiving how successfully that science was applied to several branches of natural philosophy. Dr. Robert Simson was his tutor in mathematics, and in his class Mr. Robison was soon distinguished beyond any of his fellow students. Among other branches, Mr. Robison made himself well acquainted with the modes of algebra; but from professor Simson he derived a peculiar disposition to the study of geometry, assigning, for a reason, what others have often done, who are tolerably conversant with both subjects, that in the longest demonstration, the geometrician has clear and accurate ideas, which the most expert algebraist can very seldom have. Mr.

Robison had been designed, by his father, for the clerical profession, but it appears he became dissatisfied with it on account of some of the tenets in the established creed. Accordingly, in 1757, he was candidate for the office of assistant to Dr. Dick, in the professorship of natural philosophy, but, being then only 19 years of age, he was deemed too young for the duties attached to that situation, and in the following year he went to sea as mathematical tutor to Mr. Knowles, the eldest son of admiral Knowles. He embarked, with his pupil, on board the *Neptune*, of 90 guns, bound to Quebec; and, in the course of the voyage, Mr. Knowles being appointed lieutenant on board the *Royal William*, Mr. Robison accompanied him into that ship, and, at his own request, was rated as midshipman. In this ship he spent three years, which he thought the happiest part of his life, and during this period he acquired that knowledge of the art of seamanship which qualified him to draw up the article on that subject in the *Encyclopædia Britannica*, which was understood to be his. While on board this vessel, in the river St. Lawrence, he noticed a connection between the aurora borealis and the direction of the magnetic needle, which he pointed out to the gentlemen on the quarter-deck. During the siege of Quebec, Mr. Robison was sent, with a party of seamen and petty officers, to reinforce the crew of the *Sterling-Castle*, which was lying before the city, and was thus enabled to see much service both on board and on shore. He was likewise not unfrequently employed in taking surveys of different parts of the river. Upon the surrender of Quebec he returned to the *Royal William*, and spent the whole of the following year in the Bay of Biscay, and on the coasts of Spain and Portugal. In the year 1762, upon the expectation of future preferment from lord Anson, then first commissioner of the admiralty, he went to Jamaica, for the purpose of trying Harrison's time-keeper, and on his return to England he received the painful intelligence that his beloved pupil had, with the whole crew of the *Peregrine*, of which he was commander, perished, by the vessel's foundering at sea. He now felt that his prospects of advancement in the navy were very slender, and determined to return to college. Very soon after, admiral sir Charles Knowles confided to him the instruction of his younger son. At Glasgow he renewed his studies with great ardour, and in the year 1767, when Dr. Black was called to Edinburgh, the senate of the university of Glasgow, on his recommendation, appointed Mr. Robison his successor, as lecturer in chemistry. In the year 1770, sir Charles Knowles appointed him his official secretary to the court of Petersburg, whither the gallant admiral was going to assist in improving the Russian navy. They set out upon their journey over land, and passing through Liege, they were invited to dine with the prince-bishop: Mr. Robison observed, with some degree of surprise, that all the guests, and even the principal attendants, had about them the badges of free-masonry; upon some enquiries he was induced to become a member, and during his stay in that city he passed through all the degrees, till he attained the rank of Scotch master. At Petersburg he was appointed inspector-general of the corps of marine-cadets; an academy consisting of above four hundred young gentlemen and scholars, under the tuition of about forty teachers. His duty, in this office, consisted in visiting daily every class of the academy; in receiving weekly reports from each master, concerning the diligence and progress of every person in his class; and in advancing, twice in every year, the young gentlemen into higher classes, according to their respective merits. Of these he was constituted the sole judge, and against his decision there was no appeal. At

this period general Kutuzoff was military-head of the academy, and held the third place in the admiralty-college. This general approved all Mr. Robison's plans, adopted all his measures, and supported his authority. While in this situation, Mr. Robison presented to the admiralty-college a plan for rendering the magnificent docks at Cronstadt of some use by means of a steam-engine, which was adopted and executed with success after he had left Russia. Being attached, by his office, to that island, he found it, particularly in winter, to be a dismal solitude, where he was nearly cut off from all society. On this account, having held the appointment about four years, he determined to resign it, and to accept of an invitation from the magistrates and town-council of Edinburgh, to be professor of natural philosophy in their university. This situation he filled with great honour to himself, as well as benefit to the students of the university, till his death, which happened in 1805.

Although Dr. Robison laboured under a very distressing and painful disorder during the last eighteen years of his life, still in general his mind was active. He is well known to be author, not only of the article *Seamanship*, already mentioned, but of all the most important mathematical and philosophical articles in the third edition of the *Encyclopædia Britannica*, and the supplement to that work. They were probably the substance of his lectures delivered at college, and several of them were afterwards thrown into a different form, and published under the title of "*Elements of Mechanical Philosophy*." In 1797 this gentleman published a work, entitled "*Proofs of a Conspiracy against all the Religions and Governments of Europe, carried on in the Secret Meetings of Free-Masons, Illuminati, and Reading Societies*," a work full of declamation and absurdity, but which, owing to the furor of the times, made a great impression, and rapidly passed through several editions, but which, when reason returned to the great mass of the people, fell into deserved contempt. In 1803 Mr. Robison performed a very acceptable service to the public, by giving them an edition of Dr. Black's lectures on the "*Elements of Chemistry*," in two vols. 4to.

ROBLEDA, in *Geography*, a town of Spain, in the province of Leon; 22 miles S. of Ciudad Rodrigo.

ROBLINTON, a township of Washington county, in Pennsylvania, containing 770 inhabitants.

ROBO, a town of Arabia, in the province of Yemen; 12 miles E.N.E. of Zebid.

ROBOAN. See **RUBIN**.

ROBORANTIA, in *Medicine*, *strengtheners*; or such medicines as strengthen the parts, and give new vigour to the constitution.

ROBORTELLO, **FRANCESCO**, in *Biography*, an Italian man of letters, born at Udine in 1516, was the son of a notary and noble of that city. He was educated at Bologna, and about 1538 was invited to occupy the chair of eloquence at Lucca. In 1543 he removed to Pisa, where he held a similar professorship. In 1552 he was called to Padua to fill the chair of Greek and Latin eloquence, vacant by the death of Lazzaro Buonamici. He quitted Padua for Bologna in 1557; whence, in 1560, he was recalled by the senate of Venice to his chair at Padua. He died in 1567, in his 51st year. The university gave him a splendid funeral, and the German nation erected a handsome monument to his memory in the church of St. Antonio. At most of the places of his residence he was involved in quarrels with his colleagues, and his writings are full of attacks upon his contemporaries. He published numerous works, among which were, "*Annotations on various Authors, Greek and Latin*," 1543, republished in 1548, with several small treatises;

treatises; a corrected edition of "Aristotle's Poetics," together with a paraphrase on "Horace's Art of Poetry;" an edition of the "Tragedies of Æschylus;" of "Ælian's Tactics," with a Latin version; and of "Longinus de Sublimitate," with annotations. He also published a valuable work "De Vita et Victu Populi Romani sub Imperatoribus Cæsaribus Augustis," with ten other dissertations on subjects of Roman antiquity.

ROBUR CAROLINUM, in *Astronomy*. See ROYAL OAK.

ROBUSTI, GIACOPO, in *Biography*. See TINTORRETTO.

ROCA, or ROCCA, in *Geography*, a cluster of islands in the Caribbean sea, near the coast of South America. N. lat. $12^{\circ} 20'$. W. long. $66^{\circ} 6'$.

ROCA, *Cape*, a cape on the W. coast of Portugal, generally called by the English sailors the "Rock of Lisbon." N. lat. $38^{\circ} 45'$. W. long. $90^{\circ} 34'$.

ROCA Point, a cape on the E. coast of England, in the county of Durham. N. lat. $55^{\circ} 1'$. W. long. $1^{\circ} 21'$.

ROCAB, a town of Arabia, in Hadramaut; 50 miles S.S.W. of Sahar.

ROCABERTI, JOHN THOMAS DE, in *Biography*, a Spanish prelate in the seventeenth century, was descended from a noble family, and born at Pefclada, on the frontiers of Catalonia, about the year 1624. He entered into the order of St. Dominic; was made provincial of Aragon in 1666; general of his order in 1670; archbishop of Valencia in 1676; inquisitor-general in Spain in 1695; and twice appointed viceroy of Valencia. By his authority as general, he selected from the mass of manuscripts belonging to his order, the most valuable unpublished labours of several of its members, which he directed to be printed, but at his own private expence. Besides some devotional tracts, he published a treatise "De Romani Pontificis Auctoritate," 1693, in three vols. folio. This work was very favourably received in Spain and in Italy; but the sale of it was prohibited in France, by a decree of the parliament of Paris. He spared no pains in procuring all the treatises which had been composed by different authors in defence of the pope's authority and infallibility, and made provision for their being printed in an uniform edition at Rome. This enormous collection is entitled "Bibliotheca Maxima Pontifica," &c., and consists of twenty-one folio volumes. The archbishop died in 1699.

ROCAIBA, in *Geography*, a town of Arabia, in the province of Hedsjas; 120 miles E.N.E. of Mecca.—Also, a town of Arabia, in the province of Nedsjed; 17 miles E. of Mecca.

ROCAMA, in *Botany*, an Arabian name, applied by Forskall, in his Fl. Ægypt-Arab. 71, to the Linnæan *Trianthema pentandra*, which he there establishes as a distinct genus. See TRIANTHEMA.

ROCAMADOUR, in *Geography*, a town of France, in the department of the Lot; 22 miles N. of Cahors. N. lat. $44^{\circ} 48'$. E. long. $1^{\circ} 42'$.

ROCAMBOLE, a mild sort of garlic, by some called Spanish garlic; being much of the nature of shallot; and well known in cookery, in quality of a sauce. See ALLIUM.

ROCAPARTIDA, in *Geography*, an island in the North Pacific ocean. S. lat. 16° . W. long. $92^{\circ} 14'$.

ROCAS, a town of Arabia, in the province of Oman, near the sea; 30 miles W.N.W. of Oman.

ROCAVION, a town of France, in the department of the Stura; five miles S.S.W. of Coni.

ROCCA, ANGELO, in *Biography*, a learned Italian monk and titular bishop, was a native of Rocca Contrata, a town in the marche of Ancona, and born in the year 1545. When young he took the habit among the hermits of St. Augustine, and pursued his studies at Rome, Venice, Perugia, and Padua. Having distinguished himself by his proficiency in the various branches of literature, sacred and profane, he was honoured with the degree of doctor of divinity by the university of Padua, and afterwards acquired much celebrity as a preacher at Venice. His general appointed him to several confidential and honourable employments, and at last made him secretary to his order. After he had retained this post some years, pope Sixtus V. placed him in the Vatican in 1585, and confided to his superintendance those editions of the bible, the councils, and the fathers, which issued from the apostolical press during his pontificate. In the year 1595, pope Clement VIII., by way of reward for these services, made him apostolical sacristan, and titular bishop of Tagasté in Numidia. He collected a very large and excellent library, which he left by his will to the Augustinian monastery at Rome; but upon the express condition, that it should be always open for the benefit of the public. This was the first library formed in that city to which the public had freedom of access, and it was properly called, after the name of its beneficent founder, the "Angelical Library." Rocca died in 1620, at the age of 75. He published "Bibliotheca Theologica et Scripturalis;" "Notæ in Novum Testamentum;" "De Patientia;" "De Cometis;" "Observationes in VI Libros Elegantiarum Laur. Vallæ;" "Observationes de Lingua Latina;" and other pieces which were collected together, and printed in two vols. folio, in the year 1719. From his manuscripts was also published, in 1745, a very curious collection, entitled "Thesaurus Pontificiarum Antiquitatum, necnon Rituum ac Cæremoniarum;" in two vols. folio.

ROCCA, in *Geography*, a town of Istria; one mile N. of Monfalcone.—Also, a town of Naples, in Lavora; 19 miles N. of Sezza.—Also, a small island in the West Indies; 24 miles W. of Orchilla.—Also, a town of the Ligurian republic; nine miles S.E. of Genoa.—Also, a town of Italy, on the east bank of lake Maggiore; 30 miles N.W. of Milan.

ROCCA, *La*, a town on the S.W. coast of the island of Canary; 15 miles S.W. of Ciudad de los Palmas.

ROCCA Albegna, a town of Etruria; 28 miles S. of Sienna.

ROCCA dell' Aspro, a town of Naples, in Principato Citra; 15 miles W.S.W. of Cangiano.

ROCCA Bruno, a town of France, in the department of the Maritime Alps, near the coast of the Mediterranean; three miles E.N.E. of Monaco.

ROCCA Contrada, a town of the duchy of Urbino; 24 miles E.S.E. of Urbino.

ROCCA del Este, a rocky islet among the Canaries; eight miles E. of Gratiofa.

ROCCA Gloriosa, a town of Naples, in Principato Citra; seven miles W. of Policastro.

ROCCA Lanzone, a town of the duchy of Parma; nine miles W.S.W. of Parma.

ROCCA del Marino, a town of Italy, in the Trevifan; 16 miles N. of Trevigio.

ROCCA Minolfa, a town of Naples, in the county of Molise; eight miles S. of Molife.

ROCCA Mensena, a town of Naples, in Lavora; three miles N. of Sezza.

ROCCA *di Neto*, a town of Naples, in Calabria Citra; four miles S.S.W. of Strongoli.

ROCCA *del Oucste*, or *West Rock*, a rocky islet among the Canaries; six miles S.W. of Aleganza.

ROCCA *Romana*, a town of Naples, in Lavora; six miles N. of Capua.

ROCCA *Vallé Oscura*, a town of Naples, in Abruzzo Citra; five miles S. of Sulmona.

ROCCA *Vecchia*, a town of Naples, in Lavora; 14 miles N.E. of Sezza.

ROCCA *Voltraia*, a town of Etruria; three miles N.E. of Volterra.

ROCCABIANCA, a town of the duchy of Parma; 15 miles N.N.W. of Parma.

ROCCABILIERE, a town of France, in the department of the Maritime Alps, and chief place of a canton, in the district of Nice. The place contains 1143, and the canton 3631 inhabitants, on a territory of 455 kilometres, in five communes.

ROCCALANA, a town of Italy, in the country of Friuli; 16 miles N.N.W. of Friuli.

ROCCARION, a town of France, in the department of the Stura; four miles S.W. of Coni.

ROCELLA, in *Botany*, an Italian name for that species of *Lichen*, known to our dyers under the appellation of Argol, or Orchall; for which, in dyeing red or purple, the Scottish *Lichen tartareus* is but an inadequate substitute, the colours it affords being far less permanent. See LICHEN, sect. 8. n. 115.

ROCCO RODIO, in *Biography*, an ancient Neapolitan contrapuntist and writer on music. Padre Martini (*Hor. della Mus. vol. i. p. 447.*) places Rocco Rodio at the head of the Neapolitan school, after Tinctor. But it is difficult to ascertain the exact period when Rocco Rodio flourished. We have, however, been so fortunate as to find an edition of his precepts, to which P. Martini alludes, that was printed at Naples 1609; but this date tells us nothing, as the work had certainly appeared much earlier in another form. Battista Olifante, the editor of this edition, seems not to give the rules of Rocco Rodio in his own words, but explanations of the doctrines and examples he had left. If this explication of the rules established by Rocco Rodio was written by himself, he must have flourished late in the sixteenth century: as Adriano Willaert and Cipriano Rore are both mentioned in the text: and both these masters were living after the year 1550. The full title is the following: "Regole di Musica di Rocco Rodio, sotto brevissime risposte ad alcuni dubij propostogli da un Cavaliero, intorno alle varie opinioni de Contrapontisti. Con la Dimostrazione di tutti i Canoni sopra il Canto-fermo, con li Contraponti doppij, e rivoltati, e loro regole. Aggiuntavi un'altra breve Dimostrazione de dodici Tuoni regolari, finti e trasportati. Et di nuovo da Don Batt. Olifante, Aggiuntivi un Trattato di Proporzioni necessario, á detto Libro, e ristampato. In Napoli, MDVIII."

The rules and examples for composing canons of all kinds are remarkably short and clear in this tract, which is so scarce, that we have never seen it in any public library or catalogue of books; and P. Martini, who mentions the work, seems never to have been in possession of it. Our copy was purchased at the sale of the late Mr. Belway's collection of music, the admirable organist of St. Martin's church.

Rocco, in *Geography*, a town of the Ligurian republic; 11 miles S.E. of Genoa.

ROCELLA, a town of Naples, on the coast of Calabria

Citra, near which is a celebrated coral fishery; 10 miles N.E. of Giarau.

ROCH, CAPE, a cape on the E. coast of Majorca. N. lat. 39° 40'. E. long. 3° 5'.

ROCHDALE, a market-town and parish in the hundred of Salford, and county of Lancaster, England, is situated in a valley watered by the river Roch, at the distance of 46 miles S.E. from Lancaster, and 197 N.N.W. from London. In the town, besides the parish church, there are places of worship for Presbyterians, Baptists, and Methodists. Here is a free grammar-school, founded by archbishop Parker, also an English free-school, erected and endowed by Mrs. Hardman, and several Sunday-schools. The market days are Monday and Saturday; and there are fairs annually on the 14th of May, Whit-Tuesday, and the 7th of November. The petty sessions for Rochdale and Middleton division of the hundred of Salford are holden here. This town is situated in three townships, *viz.* Castleton, Spotland, and Wardleworth. The largest portion of it is within Wardleworth. The parish is of great extent, and is divided in seven districts, or townships, *viz.* Blackenworth, Butterworth, Todmorton, Wuerdale, and the three townships above-mentioned, all of which maintain their poor separately. According to the late parliamentary returns, these united districts contained 6552 houses, and 37,224 inhabitants. The vicarage here is superior in value to any other living of a similar description in the kingdom. In the reign of Henry VIII. it was rated as low as 11*l.* 4*s.* 9½*d.*, but it has since increased to nearly a hundred and fifty times that amount. It is in the gift of the archbishop of Canterbury, to whom the tithes belong, which are let for a term of years. Nine chapels of ease are attached to the church of Rochdale, *viz.* St. Mary's in the town, Littleborough, Milnrow, Todmorton, Whitworth, Friermeer, Lydgate, Saddleworth, and Dobcross: most of which are in the patronage of the vicar. Rochdale parish is rich in the mineral products of slate, stone, and coal. It is also, and has long been, distinguished for its trade. A branch of the woollen manufacture is its staple, of which the chief articles are bays, flannels, coatings, and broad cloths; but there is likewise a considerable cotton trade carried on both in the town and its vicinity. In the township of Whitworth formerly resided Messrs. John and George Taylor, better known by the name of the Whitworth Doctors. "The fame of these rustic artists," says Dr. Aikin, "is almost equal to that of the celebrated Swiss doctor mentioned by Mr. Coxe, and has spread not only over the more immediate neighbourhood, but to remote parts of the kingdom, and even to the metropolis itself. They were chiefly noted for setting broken and dislocated bones, and for the cure of cancerous and other tumours by caustics, properly termed by themselves *keen*." Lord Byron, the poet, is lord of the manor of Rochdale, and takes his seat as an English peer under the title of baron Byron of Rochdale. At his court-leet, the officers and constables for the civil government of the parish are annually appointed.

The principal seats in this vicinity are Belfield, which formerly belonged to the Knights Templars; Foxholes, the residence of the Entwisle family; and Studley, long the property of the Holts, a memorable name in this district of the country. The house appears to have been erected by Robert Holt, esq. in the reign of Henry VIII. and consists of a centre and two wings. Whitaker, in his History of Whalley, describes it as containing within "much carving in wood, particularly a rich and beautiful screen between the hall and the parlour, with a number of crests, cyphers, and cognizances

cognizances belonging to the Holts, with other neighbouring families. It was abandoned for the warmer and more fertile situation of Castleton by Robert Holt, esq. about the year 1640."

The township of Castleton derives its name from an ancient castle which formerly reared its embattled walls within its limits, on a spot where still remains a lofty artificial mound of earth called the keep. Dr. Whitaker supposes that a castle stood here anterior to the Norman conquest, as in a record in the Harkeian collection, apparently part of an inquisition taken after the death of Thomas of Lancaster, "it is described as the site of an ancient castle long since gone to decay." A Description of the Country from thirty to forty Miles round Manchester, by J. Aikin, M. D. 4to. London 1795. Whitaker's History and Antiquities of the ancient Parish of Whalley, &c. 4to. 1806. Beauties of England and Wales, vol. ix. by John Britton, F. S. A.

ROCHDALE, a town of Pennsylvania, in Crawford county, containing 401 inhabitants.

ROCHE, a town of France, in the department of the Upper Rhine; two miles S. of Delmont.—Also, a river of America, which runs into lake Erie, N. lat. 42° 20'. W. long. 82° 53'.—Also, another which runs into the same lake, N. lat. 41° 48'. W. long. 81° 25'.

ROCHE, or *Stony River*, a river of America, which runs into the Mississippi, N. lat. 40° 50'. W. long. 91° 42'.

ROCHE, *La*, a town of France, in the department of the Leman, and chief place of a canton, in the district of Bonneville; 12 miles N.E. of Annecy. The place contains 2447, and the canton 7685 inhabitants, on a territory of 150 kilometres, in eight communes. The town is situated near the river Bonne, and is so called from a rock near it, and lies on the declivity of a hill, in a fertile country, diversified with arable lands and meadows. It is surrounded by an ancient wall and defended with towers. The principal occupations of its inhabitants are tanning of leather and making of shoes. It contains, besides a parish church, several religious houses.—Also, a town of France, in the department of Mont Blanc; 10 miles S.E. of Montier.

ROCHE, *La*, or *Roche en Ardennes*, or *en Famine*, a town of France, in the department of the Sambre and Meuse, belonging to the duchy of Luxemburg: formerly a well fortified town, with a castle commanding the town and ramparts, surrounded with the waters of the river Ourte, which passes through it. It is the capital of a comté, called "the comté of Ardennes," which comprehended 51 towns and villages. In 1703 it suffered very much from fire; 28 miles S. of Liege. N. lat. 50° 10'. E. long. 5° 33'.

ROCHE *l' Abeille*, *La*, a town of France, in the department of the Upper Vienne; 6 miles N. of St. Yriax.

ROCHE *des Arnauds*, *La*, a town of France, in the department of the Higher Alps; 6 miles W. of Gap.

ROCHE *Beaucourt*, *La*, a town of France, in the department of the Dordogne; 12 miles S.W. of Nontron.

ROCHE *Bernard*, *La*, a town of France, in the department of the Morbihan, and chief place of a canton, in the district of Vannes, situated on the Vilaine; 21 miles S.E. of Vannes. The place contains 6272, and the canton 10,959 inhabitants, on a territory of 212½ kilometres, in 8 communes. N. lat. 47° 31'. W. long. 2° 12'.

ROCHE *les Beaupré*, a town of France, in the department of the Doubs; 5 miles N.E. of Befançon.

ROCHE *Blanche*, *La*, a town of France, in the department of the Puy de Dôme; 5 miles S. of Clermont.

ROCHE *Bonnet*, a small island, near the W. coast of France, in the bay of Bourg Neuf.

ROCHE *Canillac*, *La*, a town of France, in the depart-

ment of the Corrèze, and chief place of a canton, in the district of Tulle; 9 miles S.E. of Tulle. The place contains 375, and the canton 6845 inhabitants, on a territory of 232½ kilometres, in 11 communes.

ROCHE *Cbalais*, *La*, a town of France, in the department of the Dordogne, on the Dronne; 15 miles S.W. of Riberac.

ROCHE *Darrien*, *La*, a town of France, in the department of the Northern Coasts, and chief place of a canton, in the district of Lannion, situated on the river Treguier; 3 miles S. of Treguier. The place contains 1102, and the canton 10,329 inhabitants, on a territory of 112½ kilometres, in 12 communes.

ROCHE *Guyon*, *La*, a town of France, in the department of the Seine and Oise, on the Seine; 8 miles N.N.W. of Mantes.

ROCHE *Melon*, *La*, a mountain of Piedmont, near Suza, supposed to be the highest in Italy, and to be that from the eminence of which Hannibal shewed to his army the fertile country which he thus animated them to conquer.

ROCHE *Milley*, *La*, a town of France, in the department of the Nièvre; 12 miles S.E. of Moulins.

ROCHE *Reigner*, *La*, a town of France, in the department of the Upper Loire; 12 miles N. of Le Puy.

ROCHE *Servière*, *La*, a town of France, in the department of the Vendée, and chief place of a canton, in the district of Montaigu; 9 miles W.S.W. of Montaigu. The place contains 425, and the canton 4542 inhabitants, on a territory of 165 kilometres, in 8 communes.

ROCHE *sur Yon*, *La*, a town of France, in the department of the Vendée, and chief place of a canton, in the district of Montaigu, situated on the Yon; 30 miles N.W. of Fontenay le Comte. The place contains 631, and the canton 8515 inhabitants, on a territory of 275 kilometres, in 11 communes. N. lat. 46° 44'. W. long. 1° 20'.

ROCHE, *Cape de la*, a cape on the N. coast of the island of Hispaniola. N. lat. 19° 42'. W. long. 70° 35'.

ROCHEA, in *Botany*, a genus of Decandolle's, in his *Plantes Grasses*, n. 103, dedicated to the memory of Daniel de la Roche, a physician of Geneva, whose inaugural dissertation, printed at Leyden in 1766, contains descriptions and plates of many plants of the natural order of *Enfatae*, and is often cited by writers on the genera and species of that tribe. *D: Theis.*

ROCHECHOUART, in *Geography*, a town of France, and principal place of a district, in the department of the Upper Vienne; 18 miles W. of Limoges. The place contains 1440, and the canton 7872 inhabitants, on a territory of 180 kilometres, in 7 communes.

ROCHEFORT, WILLIAM DE, in *Biography*, a modern French writer, was born in 1730, at Lyons. He had a small employment in the finances; but finding in himself a greater love to letters than to business, he went to Paris, and devoted himself to poetry and Greek literature. He composed three tragedies upon the Greek models, which had too much simplicity to please; and a comedy which was not more successful. In prose he published a "Refutation du Systeme de la Nature;" a "Critical History of the Opinions of the Ancients concerning Happiness;" and a "Complete Translation of the Plays of Sophocles;" the last named work gained him much credit by the elegance and fidelity of the version, and the judicious notes annexed to it. He then undertook the task of a complete translation of Homer's Iliad and Odyssey, of which the preliminary discourses and the notes obtained more applause than the version itself, which, however, he had splendidly printed at the royal press, in 1781, in 4to. He was a member of the Academy

Academy of Inscriptions and Belles Lettres, to which he contributed several learned memoirs. He died in 1788, highly esteemed for his private and social virtues. Gen. Biog.

ROCHFORD, in *Geography*, a town of the county of Neufchatel; 5 miles S.W. of Neufchatel.—Also, a town of France, in the department of the Puy de Dome, and chief place of a canton, in the district of Clermont; 13 miles S.W. of Clermont. The place contains 110, and the canton 12,177 inhabitants, on a territory of 365 kilometres, in 14 communes.—Also, a town of France, in the department of the Jura, and chief place of a canton, in the district of Dole, seated on the Doubs; 4 miles E.N.E. of Dole. The place contains 562, and the canton 6395 inhabitants, on a territory of 107½ kilometres, in 19 communes.—Also, a town of France, in the department of the Sambre and Meuse, and chief place of a canton, in the district of Marche, surrounded by rocks, with an ancient castle, said to be of Roman construction. The place contains 878, and the canton 5148 inhabitants, on a territory of 237½ kilometres, in 18 communes; 33 miles S.S.W. of Liege. N. lat. 50° 9'. E. long. 5° 5'.—Also, a sea-port town of France, and principal place of a district, in the department of the Lower Charente, seated on the Charente. The place contains 15,000, and the canton 17,842 inhabitants, on a territory of 162½ kilometres, in 8 communes. N. lat. 45° 56'. W. long. 0° 52'. This port has excellent docks for building, careening, and refitting vessels, and magazines well replenished with naval stores. It has also a marine academy, and an hospital for seamen; but the adjacent salt-marshes injure its salubrity. In this respect it has been improved by the drying of the marshes by canals. The town was founded by Louis XIV. A.D. 1665; it is elegantly built and fortified, and contains several churches and convents. It has water sufficient, even at low water, to float large vessels, and they are sheltered from all hurricanes, and also secured from all attacks of bomb-vessels. It is also said, that the worm, which is so destructive to ships' bottoms, does not affect them here. The approach to the town up the river is defended by several forts, and is about two leagues from the sea-coast, five from the mouth of the river, and six S.E. of Rochelle.

ROCHFORD, *La*, a town of France, in the department of the Morbihan, and chief place of a canton, in the district of the Vannes; 16 miles E. of Vannes. The place contains 628, and the canton 9837 inhabitants, on a territory of 187½ kilometres, in 9 communes. N. lat. 47° 42'. W. long. 2° 15'.

ROCHFORD, a town of France, in the department of the Seine and Oise; 4 miles N. of Dourdan.

ROCHFORD *sur Loire*, a town of France, in the department of the Mayne and Loire, on the S. side of the Loire; 13 miles S.S.W. of Angers.

ROCHFORD *Samson*, a town of France, in the department of the Drôme; 12 miles E.N.E. of Valence.

ROCHFORDIA, in *Botany*, received that name from professor Swartz, in commemoration of a French writer, De Rochford, of whom we know nothing but that he published, in 1639, *Histoire naturelle et morale des îles Antilles de l'Amérique*, with plates; a work of which a second edition appeared at Rotterdam in 1665, and an English translation, by J. Davies, at London in 1666.—Swartz Prodr. 4. Ind. Occ. v. 1. 551. t. 10. Schreb. 797. Willd. Sp. Pl. v. 1. 1328. Mart. Mill. Dict. v. 4.—Class and order, *Pentandria Digynia*. Nat. Ord. *Dumoseae*, Linn. *Rhamnii*, Juss.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, in five

deep, ovate, obtuse segments. *Cor.* of one petal; tube short, pervious; limb funnel-shaped, in five deep, ovate-oblong, spreading segments. *Stam.* Filaments five, inserted into the mouth of the corolla between the segments, awl-shaped; anthers oblong. *Pist.* Germen superior, roundish, compressed; styles two, awl-shaped; stigmas simple. *Peric.* Berry? nearly globose, of two cells. *Seeds* few, angular. Eff. Ch. Calyx inferior, in five deep segments. Corolla funnel-shaped, pervious at the mouth. Fruit of two cells, with several seeds.

1. *R. cuneata*. Wedge-leaved Rochfordia. Willd. n. 1. Swartz Ind. Occ. v. 1. 552.—Leaves wedge-shaped, obovate, undivided.—Native of dry, stony, mountainous places in Jamaica. *Stem* shrubby, three or four feet high, erect, with round, zigzag, subdivided, grey branches, armed with a solitary projecting thorn, near the insertion of each foot-stalk. *Leaves* about three, rarely more, together, in alternate tufts, stalked, generally quite entire, sometimes emarginate, rather rigid, smooth, and somewhat shining, on both sides, of a brownish-green, slightly ribbed; paler beneath. *Footstalks* short. *Flowers* small, greenish or whitish, in dense forked, cymose, terminal or axillary, clusters, shorter than the leaves. *Calyx* downy, as well as the *germen* and *stigmas*. The *fruit* was only seen in an unripe state by Dr. Swartz, so that he could not determine whether it were a berry or capsule.

2. *R. ovata*. Ovate-leaved Rochfordia. Willd. n. 2. Swartz Ind. Occ. v. 1. 554.—Leaves ovate, emarginate.—Native of bushy stony places in Jamaica. A *shrub*, with round smooth branches. Swartz makes no mention of thorns. The *leaves* are alternate, stalked, ovate, emarginate at the summit, but otherwise entire, slightly villous, veiny, an inch long. *Flower-stalks* one-fifth only of the length of the leaves, each bearing many *flowers* in pairs. Unripe *fruit* like the foregoing.

ROCHFORDCAULT, FRANCIS, duke of, prince of Marillac, in *Biography*, a well-known writer in the age of Louis XIV. was born in 1613. He distinguished himself as one of the most brilliant young noblemen about the court, and formed a connection with the duchess of Longueville, which involved him in the civil war of the Fronde. At the battle of St. Antoine, in Paris, he signalled his courage, and received a musket shot, which for some time deprived him of sight. When these troubles were terminated, he devoted himself to the pleasures of society and literature. His house was the resort of the best company at Paris, in point of talents and understanding, and his conversation was relished by Boileau, Racine, Sevigné, and La Fayette, and the other literary characters of France. Nor did he only shine by his wit and vivacity; he displayed great firmness of mind under domestic losses (having had one son killed and another wounded at the passage of the Rhine), and under the pain of the gout, with which he was afflicted in his latter years. Mad. de Sevigné speaks of him as "holding the first rank in courage, merit, tenderness, and good sense." In Mad. Maintenon's Letters is the following portrait of the duke. "He had a happy physiognomy, a grand air, much wit, and little learning. He was intriguing, supple, and wary: I never knew a friend more solid, more open, or who gave better counsel. He loved to take the lead. Personal bravery appeared to him a folly, and scarcely did he disguise this opinion; yet he was very brave. He preserved till death the vivacity of his disposition, which was always very agreeable, though naturally serious." The duke de Rochefoucault died with philosophical tranquillity at Paris in 1680, in his 68th year. He made himself famous by a work entitled "Reflexions et Maximes,"

Maximes," many times printed, and translated. Voltaire speaks thus of it: "This little collection, written with that delicacy and finesse which render a style so captivating, had the rare merit of accustoming readers to think, and to give a lively and precise expression to their thoughts." The fundamental principle of this work is, that self-love is the motive of all our actions. It is therefore, perhaps, less the history than the satire of the human race: but it is a satire which, says a writer, pleases, because it flatters malignity, and because it excuses men from the admiration of virtue, by giving it a principle in common with vice, and thereby stripping it of the heroism attributed to it. It seems allowed, says Dr. Aikin, that the writer painted very exactly the world in which he lived, but a lover of mankind will scarcely admit that world to have been a fair example of the species. Misanthropes have taken pleasure in his sentiments, and Swift has made one of his thoughts the basis of his most finished piece, the poem on his own death. The duke also wrote "Memoires de la Regence d'Anne d'Autriche," 2 vols. 1713, an energetic and faithful representation of that stormy period, in which he was himself an actor. Gen. Biog.

ROCHEFOUCAULT, *La*, in *Geography*, a town of France, in the department of the Charente, and chief place of a canton, in the district of Angouleme; 12 miles N.E. of Angouleme. The place contains 2586, and the canton 14,574 inhabitants, on a territory of 252½ kilometres, in 17 communes. N. lat. 45° 46'. E. long. 0° 28'.

ROCHELLE, *La*, a sea-port town of France, and principal place of a district, in the department of the Lower Charente, with a good harbour. The place contains in the E. and W. divisions 18,000 inhabitants: the canton of the former has 14,636, on a territory of 77½ kilometres, in 7 communes; and that of the latter 13,642 inhabitants, on a territory of 75 kilometres, in 7 communes. In the middle age it was called Rupella and Portus Santonum: it was, before the revolution, the capital of Annis, and a bishop's see. It was the birth-place of Reaumur, Defagulier, &c. The town is considerable, having an academy of sciences established in 1732, an hospital, and two suburbs. It is regularly built in a marshy situation; the entrance of its harbour is narrow, and is defended by two towers. The circumference of its ramparts is about three miles. Its manufactures are delft ware, glass, refining of sugar, &c. and its commerce, particularly to the French colonies in Africa and America, was, before the last war, very considerable. In 1361 Rochelle was given up to the English. In the 16th century, the inhabitants joined in the reformation, fortified the town, and held out a siege. In 1622 Louis XIII. in order to compel them to surrender, ordered Fort Louis to be constructed at the entrance of the harbour, and in 1628 a mole was raised which surrounded it, in order to prevent the town from receiving any succour by sea. The besieged were at length compelled by famine to surrender; in consequence of which it was deprived of its privileges and its fortifications demolished; but in the reign of Louis XIV. they were repaired by Vauban. N. lat. 46° 9'. W. long. 1° 3'.

ROCHELLE, *New*, a town of America, belonging to the state of New York, in Long island sound; 6 miles N.N.E. of West Chester. N. lat. 41° 54'. W. long. 73° 46'.

ROCHELLE *Salt*. See *RUPELLENSIS Sal*.

ROCHEMAURE, in *Geography*, a town of France, in the department of the Ardeche, and chief place of a canton, in the district of Privas; 9 miles S.E. of Privas. The place contains 1110, and the canton 4372 inhabitants, on a territory of 107½ kilometres, in 8 communes.

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ROCHESTER, a city in the hundred of Rochester, late of Aylesford, and county of Kent, England, is situated on an angle of land formed by the current of the river Medway, at the distance of 8½ miles N. from Maidstone, and 29 miles E. by S. from London. According to the population census of 1811, it contained, in conjunction with the adjoining town of Chatham, 3838 houses, and 21,722 inhabitants.

Historical Events.—Rochester is said to have been originally founded by the ancient Britons, who gave it the appellation of Dwr-bryf, which signifies "a swift stream," in allusion to the rapidity of the Medway at this part of its course. When the Romans established themselves in Albion, it became one of their stipendiary stations, and was denominated by them Durobrivæ, or Durobrivis, afterwards contracted to Roibis. These facts are evidenced by the Itinerary of Antoninus, as also by the Peutingerian Tables, and receive strong confirmation from the frequent discoveries of Roman remains, which have been made at different periods within the area of the present city. During the government of that people, however, its history is completely barren; nor did it attain any celebrity for more than a century after the arrival of the Saxons, who altered its name to Hrof-cealler, whence its modern designation is derived. Ethelbert, king of Kent, who was converted to the Christian faith A.D. 597, first erected a church here, and constituted the town a bishop's see. Still, however, it was regarded chiefly as a military station, and hence is styled by Bede "a castle of the Kentish men." In the year 676, Ethelred, king of Mercia, pillaged Rochester, as did Ceadwalla, king of Wessex, within a few years of the same period. The Danish invaders likewise frequently plundered it, particularly in 839, when they sacked the city and committed many cruelties. In 885 they besieged it again, but were effectually kept in check by the inhabitants, till the great Alfred arrived with his army, and drove them back to their ships. About a century afterwards, Ethelred, king of Kent, met with a similar reception, and being frustrated in his attempt upon the city, gratified his vengeance by laying waste all the lands belonging to the see. But these sieges were trivial to what the inhabitants suffered from the Danes in 999, when the city was pillaged to the uttermost, and all the inhabitants who remained in it were put to death. From that period Rochester seems to have continued mostly in possession of the Danes till the death of Canute the Great. In the time of Edward the Confessor it belonged to the crown; and as part of the royal domains was seized by the Conqueror, by whom it was granted to his half-brother, Odo, bishop of Baieux, on whose disgrace, in 1083, it reverted to the monarch. Henry I. farmed it out to the citizens at the yearly rent of 20*l.*, which was paid by the præpositus or bailiff. He also granted to bishop Gundulph, and to the church of Rochester, an annual fair to be held on the eve and day of St. Paulinus, together with various rights and immunities. In the same reign, on the 11th of May 1130, while Henry himself, the archbishop of Canterbury, and other prelates, and many of the nobility were at Rochester, most of its buildings were consumed by fire. A similar misfortune befell it in the year 1137, and again in April 1379. These several calamities retarded the prosperity of the city; and the intestine commotions happening soon afterwards, it did not regain any great degree of consequence till the reign of Henry III. This monarch repaired, or rebuilt, the city walls, and invited it besides with a deep fosse. In 1251 the same prince held a solemn tournament here, which was attended by most of the English nobility, and by a great concourse of foreign knights. In the time of the wars be-

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between York and Lancaster, Rochester suffered much from the arms of the contending parties, and was more than once visited by the plague. Henry VIII. was twice here, once in company with the emperor Charles V. and again when he came hither to meet his consort, Ann of Cleves. During the reign of queen Mary several individuals suffered martyrdom here for their religious opinions. Queen Elizabeth, her successor, lodged upwards of a week at Rochester; and this was the first city in which Charles II. was publicly received, after his restoration to the throne in 1660. In 1665, Rochester was visited with the same plague, which committed such dreadful havoc among the inhabitants of the metropolis. From that period nothing worthy of historical record has occurred.

Municipal Government.—Rochester probably possessed a corporate community even in the time of the Saxons, but its nature cannot now be precisely ascertained. The first Norman monarch who granted to the inhabitants any privileges by charter, was Henry II. This prince gave them the city “in fee, or perpetual ferm, for 20*l.* sterling *per annum*, to hold of him and his heirs for ever, with all the appurtenances, liberties, and free customs; and that they should have a guild merchant, and several other privileges and immunities.” These advantages were still further increased by Richard I., who directed his writ to the bailiff, and the whole hundred of Rochester, ordaining, “that no one, except his servants, should purchase victuals in the city till the monks of St. Andrew had been first served.” This right was afterwards so far extended, that even the servants of the monarch were forbidden to make a prior purchase; and the monks continued to enjoy the privilege thus given till the dissolution. Henry III. not only confirmed to the citizens all former grants, but remitted to them a portion of their annual fee-ferm, and declared they were to be “exempt from toll, lastage, itallage, and murage, throughout England and the sea-ports, and should have a free market within their city, and the return of all writs whatsoever.” These privileges were renewed by Richard II. in 1378; by Henry VI. in 1438 and 1446; and by Edward IV., who further extended the bounds of the city, and ordained that the corporation should be styled “the mayor and citizens of Rochester.” Henry VIII. was the next monarch who confirmed the privileges of Rochester; and his successors, to the time of Charles I., severally did the same. By the last mentioned monarch, the corporation was made to consist of “a mayor, twelve aldermen, (of which latter number the mayor was to be one,) twelve assistants, or common council-men, a recorder and town-clerk, two chamberlains, a principal serjeant at mace, a water-bailiff, and other inferior officers.” Under this charter the city is now governed; and by virtue of it, the mayor is elected annually on the Monday previous to St. Matthew’s day. The mayor and citizens hold a court of admiralty once a-year, for regulating the oyster-fishery in those creeks and branches of the river Medway which are within their jurisdiction. Here are also held the county assises, alternately with Maidstone; likewise the petty sessions for the north division of the lathe of Aylesford. The market-day is Friday, weekly; and there are two annual fairs, on the 30th of May and the 11th of December. Rochester sends two members to parliament, and has done so ever since the 23d year of Edward I. The right of election is vested in the freemen, who are about 630 in number. Many of the representatives have been naval officers, distinguished for brilliant achievements in the cause of their country.

Public Structures.—The buildings of a public description

that chiefly demand attention, are the castle, the cathedral, the churches, the town-hall, and the bridge, each of which is entitled to separate notice.

The present castle of Rochester was one of those founded by William the Conqueror, to keep in awe his newly acquired subjects; but there seems every reason to believe that a prior one existed on the same site, as frequent mention is made of the “*Castrum Roffense*” in the Saxon annals. The Conqueror, indeed, is said, by some historians, to have only repaired the former structure. Whatever it might be, however, he committed to Odo, bishop of Baieux, the execution of the new work, and the custody of the fortrefs; but that prelate proving unworthy of his trust, he was afterwards seized, and sent as a prisoner to the castle of Rouen, in Normandy, where he continued till the accession of William Rufus, who restored him to his dignities and possessions; a favour which he shortly after ungratefully repaid, by raising an insurrection in favour of the king’s brother, Robert, duke of Normandy. Rufus, upon this, laid siege to Rochester castle, and having forced the garrison to surrender, banished the bishop from his dominions. During this siege the buildings sustained considerable injury, which the king enjoined bishop Gundulph and the prior of Rochester to repair, perhaps on account of their having shewn some attachment to the rebellious cause. Gundulph accordingly not only renovated the walls, but laid the foundation of the great square tower, which yet perpetuates his name, and entitles him to rank among the most eminent architects of Anglo-Norman times. About twenty years after this prelate’s death, the custody of Rochester castle was granted to William Corboyl, then archbishop of Canterbury, and to his successors; but this grant was resumed by Henry II. on his quarrel with the celebrated Thomas à Becket. In the reign of king John, this fortrefs was seized and garrisoned by the rebellious barons, and having been besieged by the king, was taken, after a resistance of three months. Lewis, the dauphin of France, who came over to the assistance of the nobles, however, reduced it again in subjection to the barons, by whom it was held till the accession of Henry III., when it was surrendered to the crown, and granted for life to Hubert de Burgh, earl of Kent, and justiciary of England, who was commanded to repair the buildings. The king’s favour afterwards declining, Hubert was dispossessed; and Stephen de Segrave, John de Cobham, Nicholas de Moels, William de Say, and Robert Waleran, were, in succession, appointed governors of the castles of Rochester and Canterbury. About the year 1264, after the king had occasioned much discontent among his barons, by his refusal to comply with the statutes of Oxford, he greatly strengthened the fortifications of this castle, and furnished it with every thing necessary to sustain a siege. Roger de Leybourne, who was constituted chief constable, had under him John, earl of Warren and Surrey, and other noblemen. Shortly afterwards, Simon de Montfort, chief of the associated barons, marched hither to besiege the castle, on which occasion several severe contests happened in this vicinity. Montfort succeeded in getting possession of the city, but failed in his attacks upon the castle, the siege of which he was eventually compelled to abandon. After this event, little more occurs in the history of this castle, than the names of those to whom its custody has been entrusted. Edward IV. was the last monarch who paid any attention to the state of its buildings, he having “repaired the walls, both of the castle and city, about the eleventh year of his reign.” Since then they have been alike neglected, and have gradually fallen to their present state of decay. Several

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veral estates in this county hold of Rochester castle by the ancient tenure of castle-guard. On St. Andrew's day, old style, a banner is hung out at the house of the receiver of rents; and every tenant who does not then discharge his arrears, is liable to have his rent doubled, on the return of every tide of the Medway, till the whole is discharged.

Rochester castle stands at the south-western angle of the city, on an eminence rising abruptly from the river Medway, which preserves it from attack on the west, whilst its south, east, and north sides are defended by a broad and deep ditch. The outward walls, which formed an irregular parallelogram, 300 feet in length, were strengthened by several square and round towers; but these, as well as the walls themselves, are now verging to a state of ruin. The most perfect are on the east side, and at the south-east angle; that at the angle was semicircular, and rose boldly from the ditch, which is now almost filled up. The principal entrance was on the north-east, and was defended by a tower-gateway, with outworks at the sides. The keep, or great tower, already mentioned as founded by bishop Gundulph, occupies the south-east portion of the castle area. It is of a quadrangular form, 70 feet square at the base, and is so planned, that its angles correspond with the four cardinal points of the compass. The walls on the outside are built inclining inwards from the base, and in general measure twelve or thirteen feet thick. Near the centre, on each side, is a pilaster buttress, ascending from the base to the roof; and at the angles are projecting towers, three of them square, and the fourth semi-circular, which rise twelve feet above the roof. The entrance to this part of the castle was most difficult and intricate, and displayed much architectural ingenuity. "The first ascent was by a flight of twelve steps, leading to an arched gate and covered way; beneath which a flight of seven steps led forward to a draw-bridge, that connected with the arched gateway of the entrance tower; this opened into a vestibule, between which and the keep there were no other avenues of communication than by a third arched passage in the thickness of the wall. This latter, being the immediate inlet to the body of the keep, was defended by a massive gate and portcullis, the hinges and grooves of which yet remain; and in the roof are openings for the purpose of showering down destruction on the assailants."

The interior of the keep is divided into two nearly equal parts by a strong wall, with arched door-ways of communication on each floor. In the centre of this wall is a circular hole for a well of considerable depth, neatly wrought, and open from the bottom to the very top of the keep. This tower consisted of three floors, independent of the basement story; but these floors were removed when the castle was dismantled in the reign of James I. The lowest apartments were two dark and gloomy rooms, in which the garrison stores were probably deposited. At the north-east angle is a circular winding staircase, which ascends to the summit; and near it is a small arched doorway, leading to a narrow vaulted apartment underneath the little tower, supposed to have been a dungeon for criminals. The first floor appears to have been allotted for the accommodation of servants and inferior attendants; the second floor contained the state apartments; and the third was designed for a chapel, and for bed-rooms for the family. The roof of the keep is now entirely destroyed; but it most probably consisted of a platform on a level with the top of the wall within the parapet; the latter was about five feet high, and had embrasures about two feet wide. The four towers at the angles were raised another story, and had also small platforms, with parapets and embrasures. These, as well as the first-mentioned platform, commanded a very extensive view over the

whole city, the river Medway, and the adjacent country; so that no enemy could approach within the distance of several miles without being discovered.

Cathedral and Priory.—The see of Rochester, though one of the smallest in England, derives considerable consequence from its antiquity. It was established, and a church built, as early as the year 600, by Ethelbert, king of Kent; who, at the same time, attached to the church a priory for secular canons, and dedicated it to the honour of St. Andrew. The first prelate of this see was Justus, a man of eminent learning and integrity, who had been sent from Rome to assist in the conversion of the Saxons to Christianity. He was intalled by St. Augustine, the apostle of Britain, and first archbishop of Canterbury, in the year 604, from which period the episcopal dignity of Rochester has been held in succession by ninety-four bishops, many of whom were eminent for their talents, piety, benevolence, and extensive acquirements. Paulinus, the third bishop, was reputed a saint, and his memory was held in high estimation during several centuries. Ithamar, the fourth bishop, was the first Englishman who held a prelacy in Britain. Tobias, the ninth bishop, is highly extolled by Bede, and other writers, for his literary attainments, and particularly for his intimate knowledge of the Greek, Latin, and Saxon languages. These three prelates were all interred in the ancient cathedral, and are the only bishops known to have been so honoured of all the twenty-five who presided previous to the Conquest. At the era of that event the see appears to have been fast verging to entire dissolution; but its impending fate was soon after arrested by Lanfranc, archbishop of Canterbury, who raised Ernolt, a monk of Bec, in Normandy, to the bishopric, for the avowed purpose of improving its affairs. That bishop, however, died in the first year of his prelacy, and was succeeded by Gundulph, another monk of Bec, who proved a most active agent in the re-establishment of the see. He not only recovered the alienated estates of the bishopric, but, pulling down the old cathedral, he erected a spacious and magnificent edifice in its stead. He likewise rebuilt the priory, and placed therein twenty monks of the order of St. Benedict, upon whom he bestowed extensive privileges and possessions. Gundulph had for his successor Ernulph, abbot of Peterborough; who composed the "Textus Roffensis," a work replete with information on matters of antiquity. He was likewise distinguished as an architect, having, besides his works at Canterbury and Peterborough, built the dormitory, and refectory, and the chapter-house at Rochester. He was succeeded by John, archdeacon of Canterbury, in whose time the monastery was unfortunately destroyed by fire; an event which occasioned the temporary dispersion of the monks. On the re-erection of the priory, however, they were again collected, and, through the exertions of bishop Ascelin, recovered such of their possessions as had been alienated by the cupidity of his predecessor, John, a Norman bishop, who had obtained this see on the death of his namesake above-mentioned. Ascelin's successor was Walter, brother to Theobald, archbishop of Canterbury, who was elected by the monks of Rochester. This bishop assisted at the coronation of Henry, eldest son of Henry III., on which account he was excommunicated by Thomas à Becket. During his prelacy, the cathedral sustained heavy damages by fire. This bishop died in 1182, and was succeeded by bishop Waleran, who, as well as his successor, Gilbert de Granville, was constantly engaged in litigations with the prior and monks, which were at length settled by solemn adjudication in the year 1207: notwithstanding this, however, the monks thought proper to display their hatred to bishop Granville, by refusing burial to his remains in the cathedral;

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and on being frustrated in their resistance, they hastened the interment, that it might take place before the interdiction which the nation then lay under was removed. This prelate rebuilt the bishop's palace, which had been burnt down by the fire above noticed; and also erected a cloister of stone for the monks: but the re-edification of the cathedral made very slow progress, as we find it remained unfinished till the year 1240, when Richard de Wendover held the bishopric. He had been elected to the see by the monks, in opposition to the claims of patronage maintained by Edmund, archbishop of Canterbury, who appealed on the subject to the court of Rome, but without success. On his death, in 1250, Laurence de St. Martin was advanced to the episcopal dignity, and held it till 1274, when he died, and gave place to Walter de Meriton, to whom his country is indebted for the foundation of Merton college, at Oxford, which is considered to be the "first literary community in this kingdom that had the sanction of a royal charter." His immediate successors were, John de Bradfield, who died in 1283; Thomas de Ingelthorpe, who died in 1291; and Thomas de Woldham, who died in 1316. On the decease of the latter, Hamo de Hethe obtained the bishopric. He was a very active prelate, and conferred considerable benefits on the priory and the church. His successor was John de Shepey, who had been a monk in the priory, and was a man of great learning and abilities. Some sermons attributed to him are still extant in New college, Oxford, and there are in the king's library two MSS. of his on legal subjects. He died in 1360, when William Wittesley was consecrated bishop, but was soon afterwards translated to the see of Worcester. Thomas Trilleck next obtained the bishopric, and after him Thomas Brinton, confessor to king Richard II. and the fifty-first bishop of this see. Richard Young, the third in succession after him, met with great difficulties in obtaining possession of his bishopric, owing to the death, first of pope Boniface, by whose mandate he was translated from Bangor, and afterwards of his successor, pope Innocent. At length, however, he was installed, in May 1407, and held the see till 1418, when he was removed by death, and was succeeded by John Kemp, who subsequently became bishop of Chichester and of London, and archbishop of York and of Canterbury. His successor was the learned John Langdon, who was distinguished for his extensive knowledge of history and antiquities, and was author of a chronicle of England. On his death, which happened in 1434, while he was attending the council at Basil on the part of Henry VI., Thomas Brown, D.D. was elected to the vacant see. John Lowe, the fifty-ninth bishop, was provincial of the order of Augustinian friars. He held the bishopric twenty-three years, and is supposed to have rebuilt the palace at Rochester. He died in 1467, and was succeeded by Thomas de Rotherham, subsequently bishop of Lincoln, lord chancellor, and archbishop of York. The next bishop of note was the unfortunate John Fisher, who was beheaded in 1535, by order of Henry VIII. for maintaining the supremacy of the pope in ecclesiastical affairs. His successor was John Hilsey, D.D. a controversial writer of considerable eminence, who died in 1538. Two years afterwards, the priory here was surrendered to the king; and in 1542 a new foundation charter was granted, by which a collegiate body was established in the church, to consist of a "dean, six prebendaries, six minor canons, a deacon and sub-deacon, six lay clerks, a master of the choristers, eight choristers, one grammar master, twenty scholars, two sub-sacristans, and six poor benefices," besides inferior officers. In the new establishment, Walter Phillips, the prior of the late convent, was made first dean of the cathedral; and Nicholas

Heath, D.D. was the first reformed bishop of the see. From his time to the present period, twenty-five bishops have been advanced to the episcopal dignity of Rochester, among whom the most noted were the pious Ridley, who suffered along with bishop Latimer at Oxford; Francis Atterbury, who was exiled for treasonable correspondence in 1723; and the late bishop Horsley, one of the most erudite divines the church of England can boast of.

The situation of Rochester cathedral is at a short distance south from the High-street, and east from the castle. It is of a cruciform shape, and is divided into a nave, aisles, two transepts, and a choir, with a low tower and spire rising at the intersection of the nave and great transept. This edifice evidently appears, from the different styles of its architecture, to have been the work of different eras. The chief part of the nave and west front display the massive character of the early Norman age. The west entrance is particularly deserving of attention, and must have been, when entire, a most magnificent piece of workmanship. The arch which forms this entrance is semi-circular; and is supported on each side by several columns, two of which are cut into statues, representing king Henry I. and his queen Matilda, the patrons of the founder, bishop Gundulph. The capitals of all the columns are composed of wreathed foliage, mixed with the heads of birds, and other animals. The lintel of the door, immediately under the arch, exhibits a figure, probably designed to represent the Saviour, attended by angels, and the attributes of the four evangelists. The mouldings of the arch, and the transept-stone, are charged with varied sculpture. The remaining parts of the cathedral are comparatively plain in their exterior. Entering the nave by the western door, the massive Norman style is conspicuous in the first five columns, and half of the sixth, on each side, all of them supporting circular arches, decorated with zigzag mouldings, above which is a series of smaller arches, having over them arches, corresponding, both in size and ornament, with the larger ones beneath. Still higher are two ranges of obtuse-pointed windows, each divided into three lights. The roof is of timber, with knees supported on corbels, the fronts of which are carved into figures of angels sustaining shields, on which are painted the arms of the city, the see, and the priory of Rochester, as well as those of the archbishopric and cathedral of Canterbury. The west wall appears to have been divided into ranges of niches, some of them crowned with arches, having plain and billeted mouldings, supported on small three-quarter columns, with fluted capitals: others, having neither pillar nor capital, are decorated with zigzag mouldings, continued down the sides of the recesses. The alterations made in Gundulph's design by the introduction of the present west window, are clearly to be seen in the abrupt termination of the different ranges of these niches, some of them having been cut through the centre. The two easternmost arches of the nave, on each side, exhibit a very different style of architecture to the preceding; these being in the pointed style, with deep grooved mouldings, rising from clusters of slender columns. The great tower is supported by four obtusely-pointed arches, resting on pieces of solid masonry, which are environed by slender columns of Petworth marble. The west transept is in the pointed style; but, from having been erected at different periods, the architecture is somewhat dissimilar. In the upper part of the north end is a triforium, behind which are lancet windows, each having a screen in front, divided into three arches of unequal height; the vaulting is of stone, groined, with a plain grooved moulding: several of the lesser pillars and impostes of arches are supported by corbel

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corbel heads, chiefly of monks, which display a degree of strength of feature and expression, evincing an advanced state of the art of design. The fourth end of this transept principally varies from the other in its superior lightness: like that, it has a triforium in the upper story, with lancet windows behind screens. The roof is of timber framework, in imitation of vaulting. Under a large arch, on the west side, is an opening into the chapel of St. Mary, a structure probably erected in the reign of Henry VII. It measures forty-five feet in length, and thirty-five in breadth, and exhibits on its south and west sides five spacious windows, under obtuse arches, and divided by mullions. In this chapel the consistory court of the diocese is held; and many of the bishops are buried within it. The choir is entered from the nave by an ascent of ten steps, leading through an arch, in an unornamented stone screen, which sustains the organ and organ gallery. The style of building in this part of the church is uniform in its character; neat, lofty, and solid, though not heavy. The whole consists of two tiers of pointed arches, decorated with grooved mouldings, and resting upon slender columns of Petworth marble, with plain capitals. All the windows are lancet-shaped, and are formed of single lights, except those nearest to the altar, which are divided by mullions, and appear to have been formerly filled with painted glass. The east transept of the church has two aisles, over which are apartments, (ascended to by circular winding staircases in the wall,) in which were deposited the vestments, and sacred utensils appertaining to the altars and shrines of St. William, St. Paulinus, and others, in the choir. The northern division of this transept is still denominated St. William's chapel, from the popular faint so named, whose remains were there enshrined; and to the number and value of the oblations made at whose altar the present choir owes its origin. The crypt, which extends beneath the two last mentioned portions of the church, has been thought by some to be of Norman structure; but more intelligent antiquaries assign it to the architect of the choir and upper transept, which were built by William de Hoo, in the reign of Henry III. The pointed arches in the windows and entrances are evidences of the truth. Running parallel with the fourth side of the choir is the chapter-house, which contains the library, and is entered by a richly sculptured door-way. In a large hollow between the inner mouldings is a range of human heads and flowers, in alternate succession. Beyond these, and rising above each other in detached recesses to the centre of the arch, are six whole length figures, two of which are conjectured to represent Henry I. and his queen Matilda, and the others the bishops Gundulph, Ernulph, Laurence de St. Martin, and Hamo de Hethe, to the last of whom the erection of this door-way is attributed. Over these figures are smaller ones of angels, two on each side, apparently singing praises and glorifying the Saviour, who is represented standing naked under a canopy in the centre of the arch. The library, besides an excellent collection of printed books, contains several curious and valuable MSS. among which are the original copies of the *Textus Roffensis* and the *Custumale Roffense*.

Rochester cathedral extends in length from east to west 306 feet, of which 150 are included in the nave and 156 in the choir. The breadth of the nave, with the side aisles, is 75 feet, and that of the choir is nearly the same. The western transept measures 122 feet, and the eastern one 90 feet long. The width of the west front is 94 feet, and the height of the great tower 156 feet. Several of the monuments in this church are curious, both from their antiquity and their workmanship. In the south of the choir is a plain stone chest, supposed to contain the remains of bishop Gundulph, and near it is another, on the top of which is sculp-

tured, in high relief, the figure of a bishop in pontificalibus, designed to represent Thomas de Ingelthorpe, the 44th bishop of the see. A third stone chest, of a similar description, is thought to be the tomb of bishop Laurence de St. Martin, who obtained the canonization of St. William. All these chests are constructed of Petworth marble: several others of them are dispersed throughout the cathedral. On an altar-tomb, beneath a double pointed arched canopy, variously ornamented, is a full-length portrait of bishop Walter de Merton, whose remains are deposited beneath. Another altar-tomb, in St. William's chapel, commemorates bishop Lowe; and near it are the monuments of bishop John Warner and two others of his family. On the north side of St. Edmund's chapel, entering into the crypt, is a headless episcopal figure, supposed to have represented bishop John de Bradfield, who died in the year 1283; and in the narrow aisle leading to St. William's chapel, is a monument attributed to bishop Hamo de Hethe. The other persons who have monuments here are, Richard Watts, esq. recorder of the city, who had the honour of entertaining queen Elizabeth at his seat called Satis; John, lord Henniker, and his lady, the former of whom died in 1803, and the latter in 1792; sir Richard Head, and the Rev. Samuel Denne, the learned compiler of the "*Memorials*" of this cathedral, inserted in the *Custumale Roffense*.

Adjoining to the cathedral, on the south, are the remains of the chapter-house and cloister belonging to the priory, which exhibit a very beautiful series of Norman arches and ornaments, but in a state of great dilapidation. The doorway of the chapter-house lies under a richly ornamented arch, having on each another of equal elegance, supported on short thick columns with flowered and figured capitals, and displaying an unusual variety of mouldings, zigzag, quatrefoil, and billeted. The mouldings of the southernmost arch unite with those of a smaller arch, belonging to the cloister, and these again with the mouldings of a second highly enriched door-way, the space between the transept of which and the inner moulding exhibits the mutilated remains of an historical sculpture. An arch, rising from two three-quarter columns, and intersected by two others springing from a central column, connects this door-way with a third, likewise rich in ornaments, though less so than the others. Gundulph's tower stands on the north side of the cathedral between the transepts. The masonry of this building is extremely solid, the walls being ten feet in thickness, though the entire building is only 40 feet square. The angles are strengthened by pilaster buttresses, and the windows have semicircular arches. The precincts of this cathedral appear to have occupied nearly half the area contained within the walls of the city. There were three gates leading into them, *viz.* the Cemetery gate, St. William's gate, and the Prior's gate; the first and last of which are still remaining. Only a few traces of the offices of the monastery now exist separately, but considerable parts of their walls are incorporated into other buildings. The porter's lodge consists of a small embattled tower, with a pointed archway in the centre. The site of the bishop's palace, erected by Gundulph, is occupied by a range of modern houses; and on that of the prior's lodge stands the present deanery.

Rochester had formerly four churches, besides the cathedral, which were dedicated to St. Nicholas, St. Margaret, St. Clement, and St. Mary, but the last is now totally demolished, and St. Clement's is only to be discovered as forming part of some houses on the north side of the High-street, near the bridge. The church of St. Nicholas was built in 1421, and consists of a nave, aisles, and a chancel, with an embattled tower at the north-west angle. The

windows are large and pointed; each being divided into three lights, with crockets above. St. Margaret's church is only remarkable for its fine situation, on a lofty eminence, to the southward of the High-street. The town-hall stands on the north side of the same street, and was erected about the year 1687. In the lower division of this structure is the city prison; and in the higher, the hall, a large and lofty room, containing full-length portraits of king William and queen Anne, and of several persons of distinction, connected with the city. The bridge over the Medway, here, was constructed in the reign of Richard II. by sir Robert Knolles, and John, third baron de Cobham, who not only defrayed the expence of its erection, but also left a considerable estate for its repair. For height and strength, this structure is allowed to be superior to any in England, with the exception of the bridges in the metropolis. It measures 560 in length, but is only 14 feet broad between the parapets. Its arches are eleven in number, but of these, three have been rebuilt in modern times.

The charitable institutions in this city are, St. Catharine's hospital, a grammar-school, an alms-house for the relief of poor travellers, and a free-school. The hospital was founded and endowed in 1316, by Simond Potyn, who represented this city in seven parliaments, for the maintenance of twelve poor people, who have an allowance of coal, candle, and money, annually.

The grammar-school was founded by king Henry VIII., for twenty scholars, to be called "King's scholars," with an upper and under master; together with four exhibitions to the universities. The alms-house, which stands on the north side of the High-street, was built in the reign of queen Elizabeth, the proprietor of Satis, before-mentioned, who left estates for its support. The founder of the free-school was sir Joseph Williamson, knt., who died in 1701, and bequeathed 5000*l.* to be expended in the erection of a suitable building, and in the purchase of lands and tenements to maintain two masters, and defray the incidental expences of the establishment. The History and Antiquities of Rochester and its Environs, &c. 8vo. Rochester, 1772. The History and Topographical Survey of the County of Kent, by Edward Hasted, F. R. S. and S. A., Canterbury, 4 vols. folio, 1778, reprinted, &c. in 8vo. 1797. History of Kent, by John Harris, D. D. F. R. S. folio, Lond. 1719. Registrum Roffense, and Customale Roffense, by John Thorpe, D. D. A New Topographical, Historical, and Commercial Survey of Kent, by Charles Seymour, 8vo. 1776. A Topographic Survey of the County of Kent, by Richard Kilburn, 4to. Lond. 1759. Beauties of England, &c. by E. W. Brayley, vol. viii.

ROCHESTER, a township of America, in the county of Windsor and state of Vermont; containing 911 inhabitants.—Also, a township of Plymouth county, Massachusetts, 52 miles S. of Boston; containing 2954 inhabitants.—Also, a township in Strafford county, New Hampshire, on the W. side of the N. branch of Piscataqua river; 22 miles N.W. of Portsmouth; incorporated in 1722, and containing 2118 inhabitants. One term of the court of common pleas is held annually in this town.—Also, a township in Ulster county, New York, extending W. to Delaware river; about 12 miles W. of Esopus.—Also, a township of Upper Canada, on lake St. Clair, between Tilbury and Maidstone.

ROCHET, or ROCKET, a lawn garment, worn by bishops and abbots, resembling a surplice, except in this, that the sleeves are gathered at the wrists; whereas the surplice is quite open. This was one of the sacerdotal vestments; and in that respect differed from a surplice in that it had no sleeves.

Menage derives the word from the Latin *rocbettus*, a diminutive of *rocbus*; used in writers of the lower Latin for *tunica*, and formed originally from the German *rok*. The regular canons of St. Augustine also wear rochets under their copes.

ROCHETS also denote the mantles worn on days of ceremony, by the peers sitting in the English parliament.

Those of viscounts have two bands, or borders, and a half; those of earls, three; those of marquises, three and a half; and those of dukes, four.

ROCHET, the name given to a fish, otherwise called *cuculus*, and *red-gurnard*. See GURNARD.

ROCHETTA, in the *Glass Trade*, another name for polverine.

ROCHETTA, in *Geography*, a town of France, in the department of the Maritime Alps; 16 miles N.E. of Nice.

ROCHETTE, LA, a town of France, in the department of Mont Blanc, and chief place of a canton, in the district of Chambéry, on the Galon; 10 miles S.E. of Chambéry. The place contains 855, and the canton 9092 inhabitants, on a territory of 85 kilometres, in 18 communes.—Also, a town of France, in the department of the Forests; 4 miles S.S.E. of Dierich.

ROCHFORD, a market-town, in a hundred of the same name, and county of Essex, England, is seated on the bank of a small rivulet, called the Broomhill, at the distance of 16 miles S.E. of Chelmsford, and 39 miles E. of London. The petty sessions for Rochford division of Essex are held here. The privilege of holding markets was granted to this town by king Henry III., and confirmed by Edward I. The market-house is a mean structure of timber. The market-day is Thursday, weekly; and there are annual fairs on Easter Tuesday, and the Wednesday next after the 29th of September. None of the buildings in the town are worthy of notice. The parish church, which stands about half a mile to the westward, is a plain edifice, with a lofty brick tower at the west end. Near it stands Rochford-hall, the manor-house. It is a large and stately building, for some time successively the seat and residence of the Rochfords, the Botelers, earls of Ormond and Wiltshire, sir Thomas Bullen, and Richard, lord Riche. This town gives the title of an earl to the family of Nassau. The parish contains, according to the population returns of 1811, 190 houses, and 1214 inhabitants.

The manor of this town was held by Suene at the time of the Domesday survey; and now is vested in the Long family of Wantstead park. A singular custom, called the Lawfuls-court, appertains to this manor; and is said to have originated in a conspiracy against the lord of the manor; but detecting it, he ordained as a punishment, that the tenants should ever afterwards assemble, at a certain hour of the night, on the same spot where the conspirators met, and do homage for their lands. The place is called King's-hill, where they were to assemble at midnight on the first Wednesday after Michaelmas day, and transact all their business in whispers, and record the minutes with coal, instead of pen and ink. This ridiculous custom was, till lately, continued. About four miles S.W. is Hadleigh Castle, consisting of some bold ruins; and near it is Southend, a noted watering-place. See SOUTHEND.

Raleigh, in this vicinity, though now an inconsiderable village, was formerly a market-town, and the head of the barony of Suene, a powerful Anglo-Saxon Dane, who is reported to have built a castle here, of which some important earth-works still remain. These consist of a mount, of an oval shape at the base, which is environed by a double ditch and rampart, and is further secured by addi-

tional embankments on the east side. The principal ditch is nearly fifty feet wide, and appears to have been originally of great depth. The church of Raleigh is a handsome building, in the pointed style of architecture, and contains a very ancient tomb, of beautiful "Gothic" workmanship, but without any inscription to determine the name of the person it was designed to commemorate.

About three miles to the N. W. of Rochford, on the summit of a hill, stands the remains of a very ancient church, supposed to be the same which Simeon Dunelmensis states to have been founded by Canute and Turkill in memory of the victory obtained by them over king Edmund Ironside, within the adjoining parish of Assingdon or Ashingdon. The tower is a low massive octagon, supported by strong buttresses; and in the interior are five thick columns with slightly ornamented capitals, dividing the nave from a north aisle. At Canewdon, to the eastward of Ashingdon, is an ancient encampment, of an oblong form, which probable conjecture attributes to the Danes. Its area contains about six acres of ground. The History and Antiquities of the County of Essex, by Philip Morant, M.A. 2 vols. folio, 1768, London. Beauties of England and Wales, vol. v. by E. W. Brayley and John Britton.

ROCHLITZ, a town of Saxony, in the circle of Leipzig, on the Mulda; containing three churches and a citadel, and a manufacture of cloth, fluffs, and linen; 20 miles S. E. of Leipzig. N. lat. $51^{\circ} 8'$. E. long. $12^{\circ} 41'$.

ROCHOIS, LA, in *Biography*, one of the first singers in Lulli's famous operas, whose abilities were not very stupendous, if we may judge of them by the songs which he had to execute. Good voices and good action seem to have constituted the principal merit of this singer. Many of them were brought from remote provinces of the kingdom, before they had any knowledge of music, and were taught their parts by Lulli himself and his father-in-law, Lambert, merely by the ear. But Lulli not only taught his vocal performers to sing, but to act; and sometimes gave instructions even to the dancers. The celebrated La Rochois, we find, had no other master in singing than the opera composer, Lulli. *Hist. de la Mus. par Bonnet*, t. iii. p. 207 and 209.

ROCHSBURG, in *Geography*, a town of Saxony, in the lordship of Schonburg; one mile E. of Penig.

ROCHSTADT, a town of Westphalia, in the principality of Halberstadt; 10 miles E. of Halberstadt.

ROCHUKE, a town of Bulgaria, situated on the banks of the Danube, at the foot of a hill which continues for several miles near the river, and is covered with vineyards. It is a large and populous town, about the size of Liverpool.

ROCITO, a town of Naples, in Capitanata; 7 miles S. of Volturara.

ROCK, in *Geology*, a large mass of stone, forming part of the solid covering or crust of the globe. In common language, rocks are the bare projecting stony masses that rise above the level of the ground or sea; but the geologist denominates every bed of stone that composes the compact part of our planet a rock, whether it be elevated to view, or buried deep under the surface.

The composition, structure, and arrangement of rocks comprise a most important part of the natural history of the earth, which is now beginning to engage the attention of philosophers in various parts of the world. Numerous and extended observations have greatly enlarged our knowledge of facts, and exposed the fallacy of many of those unfounded distinctions and premature generalizations, which, dignified

with the name of systems, have retarded the progress of science.

In the earliest periods of civilization, when stone began to be employed for purposes of architecture or sculpture, it must have been immediately perceived that the rocks of different districts varied greatly from each other; and often in the same mountain, the upper and lower rocks were observed to be of various kinds and qualities.

In the knowledge of the qualities which ensure durability to the labours of the architect, the ancients appear to have greatly exceeded the moderns; but they did not extend their inquiries respecting rocks to any other objects than those of immediate utility. Nor, till about the middle of the last century, was the structure of the external part of the earth regarded as an object deserving the investigation of men of science, who confined themselves to forming theories of the earth in their studies, in preference to an active examination of nature.

About that time, Lehman, a German mineralogist, observed that certain rocks occupy the lowest relative position in mountainous districts, and that these rocks contain no remains of animals or vegetables; but in the upper rocks, numerous impressions and petrified relics of animals and vegetables abound. Hence he inferred, that the first were consolidated before the existence of organized life; and on this account, they were called primitive or primary. The latter were called secondary rocks, because they not only contained these organic reliquæ, but also fragments of the former rocks, and hence were supposed to be of later formation.

This division into two classes was continued by geologists until the close of the last century, when M. Werner, the celebrated professor of mineralogy at Freyburg, introduced into his arrangement another class, called transition rocks, which includes those rocks that are, in many of their characters, similar to primary rocks, but in which some organic remains occasionally occur: hence he supposed they were formed when the earth was passing from an uninhabitable to a habitable state. The stratified secondary rocks he denominated *flætz* rocks, from the German word *flatz*, signifying flat, because these rocks are generally divided into parallel strata, which are not greatly inclined from an horizontal position. The lower of these rocks were called the oldest *flætz* rocks, and the upper the newer *flætz* rocks. (See *GEOLOGY*, where a detailed account is given of the Wernerian arrangement.) Since that article appeared, more extended observations have induced even the warmest supporters of the Wernerian system to question the propriety of some of its distinctions.

"The system of classification introduced by Werner was formed principally from observations made in Saxony, and had great merit, as illustrating the geology of that part of Germany; but it has been objected with much reason to the general adoption of the terms, that they were framed to suit a particular theory, before a sufficient number of facts had been collected to warrant its reception. Subsequent discoveries have also proved, that the different classes, into which Werner has divided rocks, have not the marked and definite characters necessary to constitute a natural system of arrangement. Even the professor who first introduced into this country the divisions of transition and *flætz* rocks, as a most important discovery of Werner, now states his opinion, 'that transition rocks may alternate with *flætz* rocks, and, therefore, that the transition and *flætz* classes are not separated from each other in the manner generally alleged.' This admission is the more remarkable, when we recollect the extreme confidence with which the propriety of this classification

classification was supported, and the solemn trifling often employed to determine whether certain rocks belonged to the transition or stætz classes." (Bakewell's Introduction to Geology, 2d edit.) Indeed the term primary, or primitive, is objected to by some geologists, who consider these rocks as having been in a state of igneous fusion by subterranean fire, which gave to them their crystalline structure; but the heat acted with less force on the rocks by which they are covered, hence the latter are more earthy. Nor are appearances wanting to support this opinion. Well-authenticated instances are known of veins shooting from the lower into the upper rocks; and though much labour has been employed to controvert this fact, it is now undoubted. The granite of Cornwall sends up veins into the superincumbent schistus, or killas; hence it was inferred that the latter, which is considered as a secondary rock, was older than the granite or primary rock. It is evident the killas cannot be of more recent formation. Both rocks were probably contemporaneous; in which case, we may conceive that veins might shoot from the lower into the upper, previously to their acquiring a compact solid state. Nor will the absence of organic remains alone prove the prior formation of these rocks; for among rocks abounding in petrifications of animals or vegetables, many beds of rock occur in which no such remains are ever met with, although we are certain to find them in the strata immediately above and below. We have no means of ascertaining that the similar rocks of different districts were formed at the same time; nor can we be certain that they have not once contained organic remains, that were destroyed during the process by which they acquired their present crystalline structure. We may, however, with apparent probability, infer, that their formation was prior to the existence of animals and vegetables in our planet, in its present state; because the rocks which immediately cover them contain almost exclusively the organic remains of zoophytes, or those animals which are considered as forming the first link in the chain of animated beings.

It is only from the existence of these organic remains, we can infer, with any certainty, that the rocks in which they occur were formed in succession. The difference of these remains in the upper and lower rocks mark distinct epochs in the natural history of the globe. In the lowest rocks, which have a crystalline granitic structure, no animal or vegetable remains have ever been found; but the calcareous rocks, which immediately cover them, contain some few remains of zoophytes and shell-fish; and in the argillaceous slate rocks, also, we occasionally meet with vegetable matter. In the sand-stone strata over these, the remains of vegetables are abundant. Above these again, in the upper calcareous strata, entire fish are occasionally found, with zoophytes and shell-fish, of a species different from those in the lower strata. In the thick beds of aluminous shale and clay over these, occur the remains of the shark and alligator; and in the alluvial soil which covers the whole, the bones of the elephant, the rhinoceros, the hippopotamus, and the mastodonte or mammoth, and of various unknown quadrupeds, are found both in our own country, and in many parts of Europe, Asia, and America. But neither in the upper nor lower rocks, nor in alluvial ground, have any remains of human skeletons been found, except where mines had formerly been worked, or in situations where their occurrence could be explained by recent causes; such as inundations and volcanic operations, as on the shores of Guadaloupe and in the neighbourhood of Vesuvius.

We believe our own countryman, Mr. W. Smith, was the

first person who observed that remains of distinct genera and species of animals were peculiar to certain strata, and that the occurrence of the same remains was sufficient to identify the same stratum, throughout a whole district, wherever it could be examined. The sagacious naturalist M. Cuvier has applied the same discovery to illustrate the geology of the country round Paris, a district most remarkable for the number and variety of fossil skeletons, and other reliquæ which it contains. See STRATA.

It is not a little remarkable, that few of the reliquæ, whether in the upper or lower rocks, belong to existing species of marine or terrestrial animals; and the vegetable petrifications found in northern latitudes resemble most those of tropical climates.

The natural history of rocks comprises, the substances of which they are composed, their internal and external structure, their position, and the order of succession, from the lowest rocks with which we are acquainted upwards to the surface—their decomposition, and the mode of their formation. The latter is the province of speculative geology, for it is only in one class of rocks, the volcanic, that we have any experience of their actual formation.

The mineral repositories peculiar to certain rocks will be described under the article VEINS, *Mineral* and *Metallic*.

The Composition of Rocks.—Rocks are either simple or compound. Those rocks which are composed of one mineral substance, are called simple, such as slate, serpentine, lime-stone, &c. although these minerals may be composed of various elementary substances. Thus clay-slate, or slate, consists of siliceous and aluminous, combined with oxyd of iron and carbon; but the combination is so intimate, as to prevent the appearance of an homogeneous substance. When two or more minerals enter into the composition of rocks, they are called compound. Thus granite is composed of quartz, felspar, and mica, closely united together, but each of these minerals preserves its own peculiar character. The elementary substances of which all rocks, both simple and compound, are formed, are, the earths siliceous, aluminous, lime, magnesia, the oxyd of iron, carbon, and sulphur. (See SILEX, ALUMINE, &c.) The newly discovered earths and metallic ores, except iron, rarely form the substance of rocks, but are found in the veins and fissures by which they are intersected.

From the above elementary substances, either separately or combined, all the simple minerals are formed which compose rocks and mountains. But it may be remarked, that siliceous enters most largely into the composition of all the lower crystalline rocks (except granular lime-stones): it forms more than two-third parts of the lower crust of the globe.

The most important simple minerals which form rocks and mountains, are quartz, felspar, argillaceous schist, or clay-slate, lime-stone, hornblende, serpentine, chlorite, mica, talc, hornstone, jasper, flint, bituminous shale, and alum-slate. Basaltic or trap rocks, and lava, are sometimes composed of one apparently homogeneous substance, but more frequently they present the appearance of compound rocks. For the characters of these minerals, see QUARTZ, FELSPAR, &c.

When two or more of these minerals are intermixed together, they form compound rocks; in these the minerals are either closely united together, without any visible cement; or aggregated and held together by the intervention of another mineral substance, which serves as a cement, and is sometimes called the paste.

The Structure of Rocks, internal and external. The latter, or the structure of rocks *en masse*, is as distinct from the former, as the order of architecture of a building is distinct from

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from the form of the bricks or stones of which it is constructed. The internal structure of simple minerals belongs properly to the department of the mineralogist, and that of compound rocks, with their external structure, to the geologist. Compound rocks are either

Granitic, composed of grains or crystals, united without a cement, as in granite.

Porphyritic, consisting of a compact ground, in which distinct crystals are imbedded; or of a granitic ground, in which some of the crystals are much larger than the rest.

Amygdaloidal, from the Latin *amygdala*, an almond, containing kernel-shaped cavities, filled with other mineral substances.

Conglomerated, composed of fragments, or rounded stones, cemented together, as in breccias and pudding-stone.

Granular, composed of small grains, either cemented, or adhering, as in sand-stones.

The external structure of rocks is either

Stratified, composed of layers or strata.

Tabular, in large plates: this includes the slaty structure in the mass.

Columnar, in regular columns or prisms.

Globular, in spherical masses.

Indeterminate, which includes all unstratified rocks that have no determinate shape.

Stratified mountains, or rocks, are composed of layers or strata lying over each other, and divided by parallel seams, like the leaves of a closed book. In the seams or partings which divide the strata, there are frequently thin laminae of soft earthy matter, but sometimes the surfaces of the upper and lower stratum are closely joined, and require considerable force to cleave them asunder. The layers are denominated strata. See STRATA.

It has been admitted, without sufficient evidence, that all stratified rocks were formed of the sediment of turbid water, which arranged them in succession over each other, as the muddy waves of the ocean deposit their contents in regular layers upon the shore. This mode of formation is called mechanical deposition. It has also been generally believed, that all rocks divided by parallel seams were formed mechanically by the action of water, and as such layers occur occasionally in crystalline rocks, it was inferred by some geologists that this was a proof that such rocks had been formed by water. Thus the tabular structure, which consists of tables or plates of rock that have generally a vertical direction, and frequently a slaty cleavage, has been confounded with stratification: this has given rise to much confusion and contradiction in the description of rocks; some geologists denying, and others asserting the stratification of the same rock. The tabular and slaty structure of many rocks may, with as great probability, be attributed to crystalline arrangement, as the lamellar structure of a crystal of felspar, or a plate of mica. The laws of crystallization have but recently arrested the attention of philosophers, and their researches have been principally confined to their effects in a small scale. The crystallization of mountain masses is equally deserving of notice, as to this cause must we refer both their tabular, columnar, and globular structure.

The columnar structure consists of regular columns or polyhedral prisms, and is almost peculiar to trap or basaltic rocks, and to volcanic rocks: these sometimes form vast ranges of natural columns, as in Iceland, the Lipari islands, the Motta in Sicily, the Giants' Causeway in Ireland, and at Staffa. It was long contended against all probability, that these columns were the effects of accidental rents occasioned by the drying or shrinking in of the mass; but their

regularity, and (in many instances) the convex and concave articulations of the joints, prove that they are effects of crystallization. These columns have been observed by Col. Imrie and others formed in currents of lava, that could be traced to the craters of volcanoes. Transactions of the Wernerian Society, vol. ii. pt. 1.

The globular structure consists of balls, sometimes detached, at other times imbedded in rocks of the same kind. These balls are frequently composed of concentric spherical layers. This structure is not unfrequent in basaltic and granitic rocks. The balls are generally harder than the rocks in which they are imbedded, and frequently retain their shape after the outer rock is decomposed. Instances of this structure occur in the basaltic rock of Staffordshire, called Rowley Rag. (See ROWLEY RAG.) Globular distinct concretions of granite are from one to two or more fathoms in diameter. These concretions are again composed of curved lamellar concretions, and always include a harder central mass. The spaces between the globes are filled with granite possessing less solidity, which decays more readily, and thus leaves the harder central masses heaped on each other, or strewn about. These distinct concretions must not be confounded with rolled masses. Beautiful examples of these concretions occur in the island of Arran, Bohemia, the Hartz, the Fichtelgebirge, and other places.

The indeterminate or amorphous structure appears to be the most common in unstratified rocks; but our confined and partial observations may frequently lead us to conclude, that rocks have no determinate structure, whereas, could we ascertain their arrangement throughout their whole extent, we might perceive that their structure, viewed on a great scale, was as regular as that of many stratified rocks.

The position of rocks, with respect to each other, is an interesting subject of geological inquiry, as it is supposed to determine their relative ages, and to elucidate the mode of their formation. When one rock covers another in such a manner as to appear moulded upon it, having the same elevations and depressions, it is said by the German geologists to lie in a conformable position. In this manner the schistose or slaty rocks frequently cover rocks and mountains of granite. Stratified rocks are also generally conformable to the shape of the lower rocks, except in situations where the strata appear to have been broken by some subsequent convulsion of nature, which has deranged their original position, and occasioned them to abut against each other, or has given the upper strata a contrary inclination to the lower. In this case their position is said to be unconformable. Where masses of unstratified rocks cover other rocks, filling up the cavities, and lie without any conformity to the shape of the lower rocks, they are called unconformable and overlying. This position is common to most rocks of volcanic origin, and to basaltic rocks; in the former there can be no doubt respecting the mode of their formation. Streams of liquid lava pouring through vast fissures and openings have covered the inequalities of the lower grounds, filling up vallies, and accumulating as the lava cooled and consolidated, thus forming immense mounds and abrupt precipices: some geologists ascribe a similar formation to basaltic and porphyritic overlying rocks.

Those rocks which are commonly imbedded in other rocks, are said to be subordinate formations; thus granular lime-stone, serpentine, and hornblende, frequently form beds in schistose rocks, such as gneiss, mica-slate, and clay-slate, and are then described by geologists as subordinate to the latter.

Beside the above positions, the continuity of rocks is frequently broken by vertical seams or fissures filled with mineral matter different from that of the rock which they intersect.

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(See *VEINS, Mineral and Metallic.*) These vertical seams of rock are sometimes of vast extent, and vary in width from a few inches to several hundred feet. The most obvious inference is, that the solid covering of the globe has been rent, and the mineral matter ejected in a state of fusion into the interstices. The similarity of the mineral matter in the greater part of these fissures, provincially called dykes, to that of volcanic eruptions, adds much probability to this opinion. Where these dykes occur, the original position of the rocks on each side is generally changed.

The dislocation of rocks and strata has been most noticed in mining districts, where it is not unfrequently observed, that a stratum which has extended with a regular inclination over a large track of country, is suddenly thrown down several hundred yards or more, and often sunk below the power of the miner to regain it. Sometimes the strata are thrown upwards, and a series of rocks, which exist on one side of the fracture, are entirely removed on the other, and have totally disappeared.

The change in the original position of all rocks and strata, with respect to the level of the sea, is a most important and incontrovertible fact. Whether the sea has diminished or retired into cavities in the earth, or whether the rocks and mountains have been raised by an expansive force, which has broken the solid covering of our planet, and lifted them from the watery abyss to the present elevation, are questions that may long divide the opinions of geologists; but that the summits of our highest mountains were buried for ages under the ocean cannot admit of doubt. On some of these summits, remains of marine animals are at present widely spread; indeed, many of the calcareous mountains of vast extent and height appear to be almost entirely formed of marine shells, which are not heaped together in confusion, but the upper and lower beds of rock contain remains of species distinct from each other; this proves that they were not deposited in their present situation by any sudden inundation, but have been collected in succession at distant periods of time.

In schistose mountains, considered as primary, the beds of rock have generally a vertical position. Some geologists suppose that all these beds were originally deposited horizontally, and have been subsequently elevated by some mighty convulsion of nature. Saussure, who has investigated with so much labour the structure of the Alps, has drawn this conclusion with respect to the rocks which compose Mont Blanc, and the mountains in its vicinity; but we are inclined to believe that the structure of these mountains, as described by this intelligent philosopher, may in many instances be explained in a more satisfactory manner, by considering it as the result of crystallization on a large scale, and the vertical beds of rock as plates of enormous crystals: indeed, Saussure himself appears to have been very frequently impressed with surprise at the tendency to crystalline arrangement observable in these mountain masses, which he describes as presenting regular pyramidal or rhomboidal forms. The crystalline nature of the rocks themselves, and the minerals which fill the vertical seams, point to crystallization as the great agent in the formation of these mountains, whether it took place in an aqueous solution, or when the whole was in a state of igneous fusion deep under the surface. In one situation near the great pyramids of granite, on the south-east side of the valley of Chamouni, he describes a chain of mountains seven or eight leagues in extent, in which the vertical section of the beds presents an arrangement exactly similar to that of the sticks of an opened fan. The lowest beds are nearly hori-

zontal, but they gradually rise till they become vertical at the summit. He says, that many other instances might be cited of a similar arrangement. Now, we can scarcely conceive it possible for any overturning of the mountain to have produced such a position of the beds; but in the crystallization of minerals on a smaller scale the diverging structure is common. There is, however, one fact, which, if it can be satisfactorily ascertained, will prove the truth of Saussure's opinion, that the vertical position of some of these rocks was not their original one. In his description of the rocks in Valorsine, he says, that he found vast beds of pudding-stone in a vertical position, between schistose rocks in a similar position; the beds on one side are gneiss or mica-slate, and on the other slate and sand-stone. The bed of pudding-stone is 100 toises thick; it consists of a fine paste or cement, composed of extremely fine schistose sand-stone, with minute plates of mica, that are perfectly parallel to the seams which divide the beds.

The fragments vary in size, from that of a grain of sand, to six or seven inches in diameter; some are angular and others rounded, resembling the boulders on the shores of the lake of Geneva. These fragments and boulders are of gneiss, mica-slate, and quartz, but none are of clay-slate. Saussure has observed, that it is impossible for these rounded boulders to have been originally placed in a vertical situation. If they were formed mechanically by the action of water, like those on the borders of the lake of Geneva, this inference is undeniable; and we must farther admit with Saussure, that the mass of this mountain, which is 1181 toises above the level of the sea, has been overturned by the same revolution which has given a vertical direction to the whole; for all these beds having the same inclination and direction as that of the pudding-stone, we are compelled to grant that their original situation was the same, and that they have suffered the same change from the same cause. The only objection to this inference that can, with any probability, be urged, is, that these rounded stones may not really be water-worn boulders and pebbles, but were formed in the same manner as the bolls of basalt and granite, which are sometimes imbedded in basaltic or granitic rocks, and which are acknowledged to be the result of a tendency to crystalline arrangement.

Saussure, however, was fully convinced that they were real boulders, and his guide, on seeing a number of the same rounded fragments on the summit of a mountain in the vicinity, expressed his surprise at finding, in that elevated situation, the pebbles and boulders he was accustomed to see on the borders of the lake. The boulders, in this situation, were evidently the remains of similar beds of pudding-stone, of which the paste or cement had been decomposed and washed away.

It is observed, that secondary strata always rise towards the primitive mountains in their vicinity, which adds probability to the opinion, that the latter were forced up from great depths, and have raised with them the rocks by which they were originally covered, and which now border the primary. The disciples of Werner, however, contend, that the elevation of secondary strata is occasioned by the inclination of the rocks on which they were originally deposited, and that they have undergone no subsequent change.

Succession of Rocks.—There are certain rocks, which commonly occupy the lowest relative position in various parts of the world; the rocks which cover them are frequently arranged in a sequence, which has much similarity in distant districts.

Werner, who formed his system from observations made

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in Saxony, where the order of succession presented considerable regularity, concluded that each principal rock constituted what he called a universal formation, or was originally spread round the globe, and that these formations succeeded in a determinate order, encircling each other like the coats of an onion.

More recent and extended observations do not confirm this conclusion to the full extent to which it was carried by the German geologists. Of the thirteen rocks which he classes as primary, some are entirely unknown in various parts of the world, and one of them, the topaz rock, has hitherto been found only in Saxony. Many of the secondary rocks, which occupy a considerable space in Europe, are nowhere met with in North or South America. In Asia, we are informed by travellers, that a range of mountains, composed of jasper, extends far more than a thousand miles through the eastern parts of Siberia, including Gore island, between that country and America. A geologist, who resided in Siberia, might be disposed to regard jasper as the principal rock-formation in the world, as it extends over a far greater space than the districts in which Werner laid the foundation of his system; on the contrary, in many parts of Europe, jasper is little known, nor is it even enumerated among the principal rocks of Werner.

Mr. Bakewell, in his "Introduction to Geology," admits only three principal rocks in the class of primary; in which arrangement he is supported by D'Aubuisson, an intelligent disciple of Werner, who, on a recent examination of the mountains in the department of Mont Blanc, found that many of the rocks, heretofore regarded as primary, contain some organic remains; hence he admits of one primary formation only, which includes granite, gneiss, and mica-slate.

Brongniart, a celebrated French mineralogist, has more recently declared his opinion, that it is no longer possible to admit the classifications established by Werner. "At the time when these were formed, they rendered an essential service to geology, and created the science; but new observations must produce correspondent changes in the denominations and system of arrangement." *Journal des Mines*, May 1814. Without adhering to systems, further than they are supported by facts, we consider granite as the lowest rock that is generally met with in alpine districts. Granite is frequently covered by a rock called gneiss, a kind of slaty granite; on this occurs micaceous schist, or mica-slate. For the characters of these rocks, see **GRANITE**, **GNEISS**, and **MICA-Slate**.

These three rocks are frequently observed graduating into each other, and sometimes alternating. The substances which compose them appear to have been in a fluid state, and to have united in various forms and proportions; and certain causes have given to the outer part a schistose or slaty structure. The gneiss and mica-slate are generally moulded over the granite, with the same elevations and depressions. Beds of other rocks, particularly of granular lime-stone, hornblende rock, and serpentine, occur occasionally in these rocks, with beds and veins of metallic ores.

The highest mountains on the continents of Europe and Asia are composed of these rocks. Mont Blanc is 15,680 feet above the level of the sea.

Granite rocks are in some instances immediately covered by slate; and in others, secondary stratified rocks rest upon granite, without the intervention of rocks which usually accompany it. More commonly, mountains of slate, or the coarse kind of slate-rock, called by the Germans grey-wacke and grey-wacke slate, cover the mica-slate and gneiss. Im-

ense beds of lime-stone frequently accompany this kind of slate, in which the remains of marine animals, principally zoophytes, appear, but different from any known existing species. A very thick bed of sand-stone, frequently coloured red by the oxyd of iron, often accompanies the coarse slate. It is called by Werner the old red sand-stone, and is succeeded by beds of lime-stone, in which the organic remains of zoophytes and shell-fish are more abundant: these are the lowest rocks in which metallic veins usually occur. Over this lime-stone we meet with numerous strata of argillaceous and siliceous sand-stones, and soft slate or shale, abounding with impressions of vegetables, impregnated with bituminous and carbonaceous matter, and alternating frequently with beds of coal. These secondary stratified rocks, called by the Germans flötz rocks, will be more particularly described under the article **STRATA**.

Again, over the strata containing coal, or more properly on the boundary of these strata nearest the sea, we meet with calcareous strata containing the remains of marine animals, but different from those found in the lower rocks. These calcareous strata consist of calcareous sand-stone, roe-stone, and chalk. See **ROE-Stone**, and **CHALK**.

It is remarkable that chalk, which is extensively spread over the southern counties of England, and the opposite coast of France, and in many of the countries adjoining the Baltic, is unknown in North and South America, and various parts of the world. Over the chalk are found thick beds of clay and sand; and in some parts of Europe there occurs over these a series of strata, containing the remains of fresh-water shells and quadrupeds. See **STRATA**, in which an account will be given of the fresh-water formation of strata in the vicinity of Paris and the southern parts of England. This appears to be the latest formation of rock that we are acquainted with, except what is taking place in our own times by volcanic fires.

It is worthy of remark, that we meet with no organic remains in the lowest rocks we are acquainted with; that the rocks over these contain a few remains principally of marine animals; that the rocks which immediately cover the marine remains, or the coal series, abound in vegetable impressions and carbonaceous matter; but we rarely meet with animal remains of any kind in these strata, until we approach nearer the sea-shore, when other calcareous strata occur again, containing, almost exclusively, the remains of marine animals, but different from those in the lower rocks. These latter strata consist of calcareous sand-stone, roe-stone, and chalk. See **ROE-Stone**.

Beside the rocks, in which some order of superposition may frequently be traced, there are other rocks which are thrown over them, apparently by some great convulsion of nature which has broken the surface of the globe, and forced them into their present position, without any regular order of succession. These rocks consist of porphyry, sienite, trap, or basalt. From the nature of these rocks, and the similarity of their position with that of volcanic rocks, many philosophers have attributed the same mode of formation to both, and suppose that the former have been originally currents of lavas formed in remote ages.

Humboldt, who has made more extended observations on volcanoes than any philosopher who has preceded him, says, that in the substances which have been ejected during volcanic eruptions, a gradation may be traced from the more ancient to those of more recent date, and that the latter have always a nearer resemblance to the lavas ejected at the present time. If this observation be correct, it will probably lead to the con-

clusion, that rocks of porphyry, sienite, trap, basalt, and lava, had all a similar mode of formation, as they agree in so many characters of composition and structure. See *VOLCANO*, *VOLCANIC Products*, *TRAP*, and *SIENITE*.

As Mont Blanc in Switzerland is the highest mountain on the continent of Europe or Asia that has been examined by any eminent mineralogist, we shall give a short account of its structure, and the rocks which compose its summit, as described by Saussure, who ascended it in 1786, and who had devoted many years to the study of the rocks in its vicinity. These rocks, situated nearly 2400 fathoms above the sea, are interesting, as being the most elevated that have been observed by naturalists; and the scarcity of rock specimens, brought from great elevations, renders his account the more deserving of notice. A more numerous collection of such specimens from various parts of the globe would throw much light on this department of science.

After having gained the highest point of the mountain, "the first thing which struck me," says Saussure, "in the entire view of the high mountainous summits which I had under my eyes from the summit of Mont Blanc, (the highest of them all,) was the kind of disorder which prevailed in their disposition. When we contemplate the range, of which Mont Blanc forms a part, from less considerable elevations, it appears as if these colossal mountains were situated in a line, and formed a chain; but this appearance vanishes entirely from the bird's-eye view which is here presented. The mountains to the north of Mont Blanc, in Savoy and Switzerland, are indeed united among themselves, so as to form mountain chains, but the primitive mountains do not present this appearance. They are distributed in great masses, or in groups of various strange forms, detached from each other, which appear at least but accidentally united, without any regularity. Thus on the east, the lofty peaks called les Aiguilles de Chamouni, the mountains of Argentiere, of Courtes, and of Taleul, form one triangular group, almost detached from Mont Blanc, and only connected with it at the base by a narrow ridge.

"On the south-east likewise, mount Zuc, La Rogne, and the other primitive mountains to the north of the summit of l'Allée Blanche, form a group nearly triangular, separated from Mont Blanc by the valley of the glacier of Miège, and which is only connected with Mont Blanc by the base of the mountains which close that glacier to the north.

"Mont Blanc itself forms a mass almost isolated, the different parts of which are not in the same line, and have no relation of situation with the other groups.

"On casting my eyes still further, I confirmed the same observation. The primitive mountains of Switzerland and Italy, which I had sufficiently near to be under my eyes, presented only separated masses, or detached groups, without order or regularity. Notwithstanding this irregularity in the forms and distributions of the grand masses, I observed certain important resemblances in the structure of their parts. All that I distinctly saw, appeared composed of plates (*feuilletés*), arranged in the same manner nearly from north-east to south-west. I had particular pleasure in observing the same structure in the Aiguille du Midi, which I had formerly endeavoured but in vain to study, being prevented by the inaccessible walls of granite that surround the base. I had a view of the Aiguille du Midi on the second day of my ascent, and never lost sight of it as I proceeded. I assured myself that it is entirely composed of magnificent plates of granite, perpendicular to the horizon, and directed from north-east to south-west. Three of these plates, separated from each other, form the summit,

decreasing gradually in height from the southern face, on the side of the Col du Géant.

"When seen from the base, these plates had the appearance of being bent, like the leaves of an artichoke; but this must be an optical illusion, for all those which I could now see distinctly appeared straight; and if there were any exceptions, they were only local, and of small extent.

"This great phenomenon of the vertical position of the plates can only be explained, by admitting a great overturning of the whole mass, which has lifted them from their original horizontal position.

"Another question, which I wanted anxiously to resolve, was also now answered. These great plates of rock preserved the same nature and quality at the summit as at the base, where I had so frequently examined them. This observation proves a remarkable property in mountains with vertical beds: each bed preserves the same nature from the bottom to the top.

"From this magnificent observatory I could comprise in one view the whole of that great phenomenon—which I had before contemplated but in parts—the elevation of the beds forming the mountains on the side of Mont Blanc. On whichever part I turned my eyes, I saw the secondary chains of mountains, and even the primitive of the second order, raising their beds against Mont Blanc, and the high summits in its vicinity. Such were the mountains on the north of Repesoir, of Passy, of Servoz, and Le Buet; on the south, the Col du Ferret, Great St. Bernard, and those of the chain of Cremon, more remote, and beyond the mountainous chains, whose escarpments turn to Mont Blanc. We saw others, whose escarpments were turned in a contrary direction. These appearances are in perfect accordance with the theory which supposes that the crust of the globe has been broken, and the beds of rock raised from their horizontal position. It follows from hence, that the horizontal distance from the bottom of the valley of Chamouni (if that were once the ancient surface of the globe) should have some correspondence with the height of Mont Blanc; and that this distance is nearly the thickness of the stony crust, which has been broken and elevated; and that, consequently, Mont Blanc, which actually rises about a league above the surface, was in its original position buried two leagues beneath it."

The naked rocks on the summit, which form two kinds of arêtes or crests of a dark colour, are of granite. The felspar in this granite is white, inclining to grey, green, or reddish: when exposed to the flame of the blowpipe, it yields a colourless transparent glass, but full of bubbles. The felspar is sometimes intermixed with a kind of earthy steatite. The quartz in this granite is semi-transparent and whitish, and appears rather unctuous in the fracture. Very minute fragments were rounded by the flame of the blow-pipe: it is, therefore, more fusible than rock-crystal. These granites are also intermixed with green and black hornblende, and with chlorite, which seems to supply the place of mica, as the latter scarcely appears, and only in minute spangles. In some places, these granites graduate into irregularly schistose rocks, composed of quartz and felspar, whose seams are filled with a brown argillaceous and ferruginous earth, that melts into a black glass. The granite on the actual summit is composed, like the above, of quartz, felspar, and hornblende or steatite. Felspar constitutes about three-fourths of the mass: the hornblende and steatite form too small a portion to be estimated, the quartz forming nearly the whole of the remaining fourth part. On the northern summit, besides the above species of granite, he

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met with a kind of trap rock, composed of minute crystals of white felspar and hornblende. On the southern summit he also found rocks of petrosilex (hornstone), of a pearl-grey colour. It is deserving notice, that the definition of these granites, as given by Saussure, would, according to the Wernerian system, bring them under the denomination of secondary granites; though surely, if any granite can properly be considered as primary, it is that of Mont Blanc, and the mountains in its immediate vicinity.

The following extract from professor Jameson's Geognosy comprises a short view of the order of succession of rocks, as laid down by the German geologists; with observations on the succession of the rocks of Saxony and Hanover, described in the quaint language peculiar to the school of Freyberg.

"In the primitive class of rocks, we observe several rocks always disposed in conformable and unbroken stratification, and in which the newer and newer strata have always a lower and lower level. Gneiss, mica-slate, and clay-slate, are of this kind. The granite stretches under them uninterrupted, and sometimes rises through them, or juts up in the form of single caps or great masses; so that the gneiss and other rocks are disposed on its surface, sometimes in a concave, sometimes in a convex direction, sometimes saddle-shaped, and frequently mantle-shaped. It is evident from these relations of the strata, that granite will frequently form the greatest heights on the surface of the globe.

"Porphyry has a very different kind of stratification from the preceding rocks. It occurs sometimes broken, sometimes unbroken. When broken, it presents caps, upfillings, and shield-shaped stratification. When unbroken, it forms widely extended masses: its position is unconformable, and overlying.

"Grey-wacke occurs sometimes in a conformable, sometimes in an unconformable position; also in caps, upfillings, and shield-shaped, and frequently mantle-shaped, strata, surrounding the older mountains.

"The lime-stone and sand-stone formations are usually disposed in a mantle-shape, round the older formation; sometimes they are broken, but more frequently unbroken. They are very common and widely distributed formations.

"Coal, again, shews a very peculiar character: its original extent is not considerable; it even appears interrupted, or broken; but its internal characters shew that its present apparently broken appearance is its original one. It occurs commonly in trough and basin-shaped hollows, and its strata have consequently a concave direction.

"The rocks of the newest flötz-trap formation are distinguished from the older by their unconformable, overlying, and broken stratification. In these respects they nearly agree with porphyry. When the continuity of the formation is broken, it occurs in caps, upfillings, and rarely shield-shaped.

"The description we have now given of the succession and structure of the different classes of rocks, will enable us to investigate the structure of the whole mountain groups. We shall illustrate this by a very short description of two well-known tracks of country, the Hartz, and the Saxon Erzgebirge, or metalliferous mountains.

"*Description of the Hartz.*—An immense mass of granite forms the centre of this country; it rises through the other strata, and is elevated a considerable height above them all, forming the famous mountain—the Brocken. Mantle-shaped strata of clay-slate are wrapped around this central mass. It is worthy of remark, that gneiss and mica-slate, two of the most considerable of the older formations, are

wanting in this country. To the clay-slate succeeds transition lime-stone, then grey-wacke, and grey-wacke slate; and the whole of these are wrapped around the granite in mantle-shaped strata, and invariably with lower and lower outgoings, corresponding to the newer and newer strata. The flötz rocks that immediately succeed the transition surround them in mantle-shaped strata. Immediately on the newest of the transition rocks rests the oldest of the flötz, the old red sand-stone; to this succeeds the other flötz formation, in the following order, according to their relative age:—first flötz lime-stone, first flötz gypsum; second or variegated sand-stone, second or newer flötz gypsum, second flötz lime-stone. These flötz rocks are the links that connect the transition with the alluvial, the next class of rocks. These are found in the lowest situations. We have thus, from granite to the alluvial formation, all the series marked with a diminishing level, in proportion to the newness of the strata.

"*Description of the Saxon Erzgebirge.*—The mine district of the electorate of Saxony has a basis of granite which rises through the super-incumbent rocks in the different places at Altenberg, Johanngeorgenstadt, and Bobrisch, on the road leading from Freyberg to Dresden. The newer formations, viz. gneiss, mica-slate, topaz-rock, and clay-slate, are wrapped around the granite in mantle-shaped strata, and the diminishing levels of the outgoings correspond to the newness of the formations. Over these we meet with other primitive formations that overlie the older formations, and their continuity is partly broken, and partly unbroken; here are porphyry, sienite, newer granite, quartz, and serpentine. Still lower down we meet with transition rocks, of which the lime-stone appears at Kalk-grun and Wildenfels; the amygdaloid at Voghtland; and the grey-wacke and grey-wacke slate near Freyberg. Still lower down, and often covering the preceding formations, we find sand-stone and lime-stone; and in several places, as at Hainchen, Pottchappel near Dresden, and Zwickau, there are depositions of the coal formation. Lastly, the newest flötz-trap formation covers all the others in unconformable, overlying, and very broken stratification."

Decomposition of Rocks.—Where rocks rise above the surface, and are exposed to the action of air and moisture, they are liable to decomposition and disintegration. The former consists in the separation of the constituent parts, the latter in the separation of the integrant parts: the one may be compared to the moulding of the stones of which a building is constructed, the other to the disjoining and dislocation of the stones in a sound state, when a building is thrown down. Both these processes frequently take place in the same rock.

The disintegration of rocks is sometimes rapidly effected by earthquakes, lightning, and the immediate action of subterranean fires. It is, however, to the more constant operations of moisture and change of temperature, that the destruction of rocks and mountains may be principally attributed; but no well-authenticated observations have yet been made to determine the extent of these effects during a given period of time. It has been vaguely stated, that the height of the Pyrenées is diminishing about one foot in a century; hence it was calculated that a million years would be required to level the rocky boundary which separates France and Spain. It is obvious that a lapse of many centuries would be required to verify such a conclusion; and though the decomposition and disintegration of rocks are, in many situations, sufficiently rapid to be observable during the short period of a single life, yet, in other situations,

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rocks present the same unvarying outline for ages, and preserve their angular sharpness, which is either natural, or, in some instances, the effect of art. Thus, the blocks of granite remaining in the quarries at Sienna, in Upper Egypt, have all the impressions of the tools with which they were worked during the latter period of the Roman empire; and the basaltic rocks formed by the extinct volcanoes of Auvergne are so compact, as to present, at this day, the appearance of trickling lava suddenly congealed, though the period of their formation was prior to the record of authentic history. The causes of disintegration are, the vicissitudes of the atmosphere, change of temperature, and the absorption and congelation of water. The sudden dilation or contraction produced by the expansion and congelation of water, is alone sufficient to rend the strongest rocks when it enters their fissures. In Greenland the rocks are said, from this cause, frequently to burst with a noise like thunder. The external causes of decomposition are, principally, water and oxygen. Mineral substances, containing sulphur or metallic matter capable of a higher degree of oxygenation, absorb oxygen from water, or the atmosphere. To this cause the decomposition of stones, containing pyrites, is to be attributed. Calces of iron, moderately oxygenated, are the most general cause of decomposition; they act by absorbing a greater portion of oxygen, by which they gradually swell, and are disunited from the other constituent parts of the stone in whose composition they enter. When least oxygenated, their colour is black, or dark brown; and in some instances, when combined with alumine, or magnesia, greenish-grey; the alumine, as it becomes more oxygenated, turns to a purple-red and orange, and finally a pale yellowish-brown; the magnesia becomes at first blue, then purple and red. Iron, in its metallic state, or, at least, when but slightly oxygenated, also decomposes water; but if exposed to the air, it becomes further oxygenated, and the compound into which it enters gradually withers, as Dr. Higgins observed, in imitating pozzolana. Higgins, on Cements, 124.

Stones, into whose composition calces of iron, highly oxygenated, seem originally to have entered, are said, by Mr. Kirwan, to decompose with great difficulty, of which he instances red jasper; but perhaps the more perfect vitrification of these minerals may be the cause of their durability.

Calcareous rocks are liable to the decomposing effects of water, partly mechanical and partly chemical. Carbonate of lime is insoluble in water, except when aided by carbonic acid; but as this exists more or less in almost all water, it acts slowly upon lime-stones, particularly on those of a loose texture. Potash and soda enter also into the composition of many rocks; and to the existence of potash in felspar, one of the constituents of granite, the decomposition of granite rocks may be generally attributed.

From the combination of some extraneous mineral substance with rocks, remarkably rapid instances of the decomposition of rocks are sometimes known to take place. According to Dolomieu, all the houses of Malta are built of a fine grained lime-stone of a loose and soft texture, but which hardens by exposure to the air. There is a circumstance which hastens its destruction and reduces it to powder, namely, when it is wetted by sea-water; after this it never dries, but is covered by a saline efflorescence, and a crust is formed some tenths of an inch thick, mixed with common salt, nitre, and nitrate of lime. Under this crust the stone moulders to dust, the crust falls off, and other crusts are successively formed, until the whole stone is destroyed. A single drop of sea-water is sufficient to produce the

germ of destruction, which gradually increases and spreads, like a caries, through the whole mass of stone; nor does it stop there, but after some time affects all the neighbouring stones in the wall. The stones most subject to this decay are those that contain most magnesia; those that are finer grained, and of a closer texture, resist it. Notwithstanding the speculations of Dolomieu and Mr. Kirwan on the cause of this uncommon property in the stone of Malta, we conceive that a satisfactory explanation is still wanting.

We have before stated, that water is the principal agent in the gradual destruction of rocks, but sometimes entire mountains are suddenly levelled by subterranean currents, which work their passage through fissures and cavities, and silently prepare the causes of the most alarming catastrophes in alpine districts. In proportion to the elevation and abruptness of rocks, these catastrophes are more frequent and extended. In the cantons of Switzerland numerous instances of this kind are on record, and one, which we shall subsequently notice, occurred in our own times.

The town of Pleurs, about a league from Chavennes, containing about 2200 inhabitants, and numerous splendid palaces, was suddenly buried under a mountain on the 25th of August, 1618.

On the same evening an inhabitant, who entered the town, advised his neighbours to leave the place, saying, he had seen the mountains cleaving, but could obtain no credit; his daughter, whom he had persuaded to depart with him, returned to lock up some valuables, and was overwhelmed with all the other inhabitants in one common ruin. Mr. Coxe says vineyards, chestnut trees, and houses, now cover the spot where this unfortunate town once stood.

On the 23d of September, 1714, a great part of the mountain Diableret fell in between two and three o'clock in the afternoon, and buried more than 100 huts, and a considerable part of the valley. Those who saw this disaster say that it happened in a moment, and at the same time whirling clouds of dust arose suddenly, which darkened the air like a sudden night.

In 1751, a mountain fell down, situated near Paffy, between Salanches and Servoz. Sauffure says, the noise was so dreadful, and so thick and dark a cloud of dust arose, that many persons supposed that the world was at an end. Intelligence was received at Turin, that a terrible volcano had broken forth in these mountains: in consequence of which the king sent the celebrated naturalist, Vitaliano Donati, to verify the report, who gives the following account of the event. "I hurried with extreme pleasure to examine so extraordinary a phenomenon. After having travelled four days and four nights without halting, I came in front of a mountain all covered with smoke, and from which were incessantly detached, both by day and night, large masses of stone with a noise perfectly like that of thunder, or of a large battery of cannon, but louder and more terrible. The peasants had all retired from the vicinity, and did not dare to look at the ruin, but at the distance of two miles, or even farther. All the neighbouring hills were covered with a dust much resembling ashes. All said they had seen at intervals a smoke, which was red during the day, and accompanied with flames at night. I attentively examined the smoke, but neither perceived flames nor any smell of sulphur. Nor did the rivulets I examined with care, present the least appearance of sulphuric matter. Thus persuaded, I entered the smoke, and though quite alone, went to the brink of the abyss, where I saw a large rock darted down, and observed that the smoke was only dust raised by the fall of the rocks, the cause of which I

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soon after fought for and discovered.—A great part of the mountain situated above that which had fallen was composed of earth and stones, not disposed in beds, but confusedly heaped together. I thus perceived that the mountain had been subject to similar falls, which had left the large rock that fell this year without a support, and with a considerable projection. This rock was composed of horizontal beds, of which the lower were of slate, or rather of fragile schistose stone of little consistency, while the two beds beneath these were of marble like that of Porto Venere, but full of fissures, which crossed the beds. The fifth bed was wholly composed of slate in vertical plates, entirely discontinued; this bed formed all the upper part of the fallen mountain. Upon the same level summit were three lakes, the waters of which penetrated constantly through the fissures of the beds of rock, and decomposed their supports. The snow, which had fallen in Savoy in greater abundance than had ever been seen in the memory of man, increased the effect, and the united waters occasioned the fall of three million cubic fathoms of rock, a mass sufficient to form a large mountain.”

On the 2d of September 1806, at five in the evening, the Knippenhoul rock, which formed the summit of mount Rosenbergh, was on a sudden detached from its situation; and at the same time part of the mountain, about 280 feet thick on the east side, and several feet thick on the west, gave way, and fell into the valley which separates the lake of Zug from that of Lauwertz. One part of the mountain fell into the lake of Lauwertz, which caused such an agitation in the waters of the lake, that they overthrew a number of houses, chapels, mills, &c. along the northern shore. Upwards of 1000 persons were the victims of this calamity. A society of thirteen travellers were on the road from Arth to Schwetz; nine who walked first perished, the other four escaped. In this convulsion enormous pieces of rock were carried through the air to prodigious distances. The lake of Lauwertz has lost about a quarter of its extent. That rich plain, before so beautiful, now presents a mountain of 100 feet in height, $1\frac{1}{2}$ league in length, and as much in breadth. The villages of Goldau and Rothen, consisting of 115 houses; that of Busingen, of 126; and that of Kuslock, have totally disappeared. Of Lauwertz, which had 25 houses, there remain ten buildings, all much damaged. Twenty years previously, general Pfyffer predicted this catastrophe, from the knowledge he had of the nature of the mountain. A professor of Schwitz said, that above Spietsfleu there was a lake of water which had undermined the rock for several years, and that below there was a cavern of great depth, where the waters were ingulphed. The quantity of water which had fallen during the preceding years hastened the catastrophe, and the rains of some preceding weeks decided it. On the 10th, eight hundred persons were employed in digging for the bodies of those who were destroyed by the falling of the mountain. In forming a channel to draw off the waters, between thirty and forty labourers were swallowed up by a torrent of muddy water which broke in upon them suddenly. Annual Register, 1806, page 449.

In the mountainous parts of North Wales, Cumberland, and Westmoreland, similar effects, on a diminutive scale, are taking place; and the scattered masses of rock, spread widely over the sides and feet of the hills, prove that they have once had a greater elevation.

By the decay of rocks and mountains, new and productive soils are formed to renovate the surface of the globe, and fit it for the support of vegetable and animal life; and it has been remarked that those rocks which form the most fer-

tile soils, are precisely those which decompose with the greatest rapidity, whilst those which are unfavourable to vegetation resist, for ages, the effects of atmospheric influence. It can scarcely be denied that this beneficent provision of the Author of nature, is ordained to repair the constant waste and change which are taking place on the surface.

“Nec species sua cuique manet, rerumque novatrix
Ex aliis alias reparat natura figuras.” Ovid.

The formation of rocks, or the process by which they acquire their present form and consistence, may, perhaps, ever remain a subject of uncertain speculation, as no analogous formations are now taking place, except in one class of rocks, the volcanic.

Some geologists contend that all the solid materials in the mineral kingdom were once in a state of aqueous solution, from which rocks and strata were formed, partly by chemical precipitation, and partly by sediment; the lower crystalline rocks being entirely chemical products, the intermediate or transition partly chemical and partly mechanical depositions; and the upper rocks and strata principally mechanical, or formed of sediment or the fragments of former rocks. It has been objected to this hypothesis, that neither the elementary substances, nor the compounds of which rocks are formed, are soluble in water. In reply to this it has been contended, that though the substances called elementary are insoluble, in all probability there was a time when they existed in a more simple uncombined state; and that the more simple elements were once soluble in water, though the present substances called elementary are not so; in the same manner as very soluble substances are known to become nearly insoluble by chemical union with each other, of which we have an instance in the tartareous acid and potash, which are both very soluble, but when united in certain proportions, they form a salt that can only be dissolved in twenty times its weight of water.

According to these geologists, the quantity of water which once covered the whole globe must have been much greater than at present; but in what manner it has been diminished they do not attempt to explain.

Other geologists suppose that most of the rocks, whether stratified or not, were formed of the sand, or sediment, washed down from former continents, and that they have acquired their present structure and hardness from the action of a central fire, which they believe to exist constantly in our planet, but which is called into greater activity at certain periods by laws with which we are unacquainted. According to the system of these philosophers, the present continents were raised from the bottom of the ocean by the action of the same fire, and the rocks of basalt and porphyry were forced through, and spread over, the surface in a state of fusion, like currents of lava from active volcanoes. It must be admitted, that the only instances we have of the formation of rocks, in our own times, are from the agency of fire; and that some of the lavas present the crystalline internal structure, or contain imbedded crystals as perfect as those found in primary rocks. It is foreign to the purpose of this article to discuss the probabilities of those two theories which have acquired the names of the Neptunian and Plutonian, for an account of which, see EARTH. The descent of stony masses from the atmosphere, sometimes of great size and weight, is now fully proved; and the formation of these stones, from the concretion of gaseous matter, may probably throw some light ultimately on the most abstruse questions in geology, and lead to new, and more correct, views of the nature of our planet. Perhaps the different primary beds of stone, that environ the globe, were formed by similar concretions from an atmosphere of vast extent. Of one thing

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thing we are certain, that the formation of many of the secondary strata was subsequent to the existence of animal and vegetable life; were it not so, their remains could not be enveloped in them. Another fact is not less certain, that many of these beds were deposited very gradually, and form a medium in a state of perfect tranquillity: this is proved by the extremely delicate unbroken fibres and spines of some of the organic remains which could not have been preserved entire, had the particles of the stony matter, by which they are covered and imbedded, been of considerable size, or had they been deposited in a tumultuous element. See STRATA.

Rocks, beside furnishing the metallic ores, and materials for architecture, have the most important uses in the physical constitution of the globe, not only as forming the solid bases or skeletons on which islands and continents are constructed, but these elevations and inequalities are absolutely necessary to supply the dry land with pure and running streams, and to drain the superfluity of moisture in rainy seasons, which would otherwise form stagnant and putrid pools, infecting the air with death: without these rocky elevations the earth must remain a solitary desert, fitted only for the abode of reptiles and amphibious animals. Thus, by the very irregularity and confusion which seem to prevail in the disposition of the fractured surface of the globe, it is rendered salubrious and productive, and prepared to satisfy the wants, and gratify the various inclinations and instincts, of its numerous inhabitants.

Rock, in *Agriculture*, a stony substance of different kinds, that frequently affords much interruption to tillage, and is highly injurious as a substratum, that occasionally upholds water, and prevents its passing downwards. Where this last is the case, they are mostly of the close, hard, compact kind. They may likewise be hurtful in other ways, as by covering the surface of grass-land, and by occupying lands which might otherwise produce useful plants. Their effects, as non-conductors of water, depends upon their qualities, in some measure, as well as upon that of the beds of earthy matter in which they are situated, and will be more fully considered in speaking of SPRING-draining. The rocky beds of free-stone, blue-stone, and lime-stone, as well as those of some other sorts, exist in very different states, in different parts of the kingdom; and are, on that account, more or less favourable to the purposes of husbandry, in the ground by which they are covered.

Rocks of particular kinds are not unfrequently instrumental, in their decompositions, in contributing to the formation of land or soil. Those lands or soils which arise, in some degree, from the decomposition of rocks of the sandstone and granite kinds, are for the most part of the thin, poor, hungry description; continuing for very great lengths of time, in many cases, with but very slight coverings of vegetable matter or plants of the grassy sort upon them. But those proceeding, in some measure, from the decomposition and mouldering down of rocks of the lime-stone, chalk, and some other kinds, are in general well and closely beset with plants of the permanent grass kind, and give, when broken up, deep rich earthy beds, for the nourishment and support of different sorts of vegetables as crops.

Where lands are situated immediately upon beds or layers of rocks or stones, they mostly become dry, and suitable for the purposes of vegetation, much sooner than where they are deposited upon an under-soil of a clayey or marly nature. This approach of the rocky strata towards the surface-beds of land or soil, is probably one great cause of the fertility of land in moist or wet climates, such as those

of some parts of this country, as many of the more northern districts, and most parts of Ireland.

The rocks and strata of other kinds, from the decompositions of which land or soils have been formed, as well as those which constitute the more internal parts of the globe itself, have a certain order and arrangement, which is not altogether useless to the inquiring farmer; especially as strata of the rocky nature, which are very different in their kinds, not unfrequently happen to be associated together; and those which are placed directly below the layers of land or soil contain materials, which may, in many cases, be of utility in ameliorating them. But the general view of the nature, composition, and position of rocks, whether of the primary or secondary kind, as well as of other natural strata of a similar description, properly belongs to the general head of *rock*; which see. See also SOIL and SUBSOIL.

Rock, in *Ornamental Gardening*, a substance or body, which is of much utility in producing effect in the forming and laying out the grounds of country residences. It is suggested by Mr. Loudon, that, though in reality these can neither be created, increased, nor taken away, yet that several operations may be effected with them, which seem of the same nature, and consequently to be of much importance in landscape. They may, it is supposed, be either *shewn, concealed*, or rendered more *characteristic*. They may be shewn with more and better effect, by taking away earth from about them, and forming breaks and abruptnesses in the surface of the ground where they are. This may, it is said, be accomplished in many different ways; but that those methods are to be preferred, which are most effectual in shewing a perpendicular surface, or upright front of rock; as it is not only the grandest manner of seeing them that can be contrived, but, at the same time, the most economical and consistent with the good management of the land; no horizontal surface of any consequence, whether of the wood or pasture kind, being to any material extent destroyed. Rocks appear in this way in a great many situations, in different parts of the country, in the ornamental grounds of residences.

It is also further suggested, that rocks may be shewn by removing of wood, either alone, or in connection with ground. This practice, it is supposed, would often have a fine effect on the sides of hills, mountains, and steeps, as well as upon the banks of rivers and lakes; in the last of which cases, it would frequently be assisted in connection with the removal of water, which can often be effected with ease: as, for instance, when a lake has an outlet, or when the channel of a river has considerable declivity. In all cases where rocks are to be shewn, it is constantly the most preferable to exhibit erect, projecting, or at least nearly perpendicular surfaces; as other kinds never occur in nature, except under the surface of water, or in barren deserts: for although they were originally, or after convulsions of nature, left wholly naked, yet by time and circumstances they have gradually become clothed on their upper surfaces by an earthy matter and vegetable productions.

Rocks may be concealed, it is imagined, either completely, or in a partial manner, and by any one or the whole of the materials which shew them. Complete concealment is, however, it is thought, rarely desirable, except in cases where the rocks are of the barren or disagreeable kind; as in the instance of a perfectly naked surface of rocks, or small naked angular fragments of them staring through ground of uniform or simple surface: in the former of which cases, they should be covered with earth; and in the latter, be blown out of the ground by means of gunpowder,

powder, or dug out of it in other ways, as is frequently the case in forming and laying out ornamented grounds.

But partial concealment may often take place in circumstances of this kind, and is, it is supposed, best effected by wood; and in case the form of the part or parts, which appear, be in the grand style, and the concealment accomplished in a judicious manner, the imagination, which is ever ready to magnify the extent or power of indistinct objects, will, it is supposed, conceive the rest to be much more noble, than if they had been of forms capable of being advantageously disclosed. Partial concealment may likewise sometimes be effected by earth or water, and even by buildings; in all of which, the general principles are the same, it is supposed.

It is stated, that in rendering rocks more characteristic, the first requisite is to attend to their general characters: these may either be grand, terrific, fanciful, or romantic and picturesque. Grandeur here consists, it is supposed, commonly in the breadth of light and shade, or the height of the masses; and may be heightened by increasing these, either by removing small parts of the rock itself, or by clearing away the appertaining matters, which tend to conceal or injure the principal masses. Romantic or terrific rocks may, it is thought, sometimes be improved by concealment or disclosure, but rarely by increasing their character. And those of picturesque beauty may often be operated upon with success, either by giving more breadth, variety, or intricacy to the rocks themselves; or by covering them with vegetation; or planting trees before them, to effect variety or harmony; or bushes and creepers above them, to hang over and produce shade and intricacy. An excess of intricacy is, however, suggested, as dangerous, and as tending more than any other quality to make a rock trifling. Crags are said to be frequently trifling on this account, as well as the rock in different situations. In short, the management of rocks, it is imagined, is yet very little, if at all, understood in this country. In many parts they are indeed seen shewn, but in such a way as that they appear little better than upright masses of red earth. The subject is unquestionably deserving of more attention than it has hitherto met with, from the designers of ornamented grounds.

Rock-Work, any sort of work or design, which is formed of the parts or fragments of rocks, or large stones, in gardens or pleasure-grounds.

All works of this nature should be contrived in such a manner, as to harmonize as much as possible with the peculiarities of the situations or places in which they are made. See **ROCK** and **STONE**.

They were formerly much more common, in both these situations, than they are at present.

Rock Alum. See **ALUM**.

Rock-Butter, in *Mineralogy*, a saline mineral, formed in the fissures of rocks of alum-slate. It occurs both massive and stalaclitical, and sometimes pulverulent. It has a greyish-white or a straw-yellow colour, and a sweetish and somewhat acidulous astringent taste, like alum. It is indeed a kind of native alum. The feel is somewhat greasy, from which and its colour it has received its name.

Rock-Cork, *Suber Montanum*, a flexible and somewhat elastic mineral, found in mineral veins. It is sometimes massive, and sometimes in laminæ or plates: these have been called rock-leather and rock-flesh. The common colour is a yellowish-grey of various shades: it is sometimes a yellowish-brown and cream-colour. It has a fibrous structure, and but little lustre. The fractured surface is delicately uneven. This mineral is opaque, and very soft,

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yielding to the nail. It breaks with great difficulty, and cracks when handled: it is so light as to swim on water, and is almost infusible in the flame of the blow-pipe.

The constituent parts, as given by Bergmann, are,

Silex	-	-	-	56.2
Magnesia	-	-	-	26.1
Alumine	-	-	-	2
Lime	-	-	-	12.7
Iron	-	-	-	3
				100

Rock-cork approaches in its nature to asbestos, from which it differs principally by the promiscuous arrangement of the fibres.

Rock-Crystal, the purest variety of crystallized quartz. (See **QUARTZ**.) This stone is sometimes employed in jewellery, and is differently named, according to the places from whence it is procured, as Bristol stone, Scotch pebbles, &c.

Rock-Fish, a common English name for the *gobius marinus*, or sea-gudgeon. See **GobiUS Niger**.

Rock Germander, in *Botany*, a species of *veronica*; which see.

Rock-Oil. See **PETROLEUM**.

Rock-Ouzel, in *Ornithology*. See **Ring OUZEL**, and **AMZEL**.

Rock-Rose, in *Botany*. See **CISTUS**.

Rock-Salt, in *Mineralogy* and *Geology*, a natural salt, of the same kind as common table salt. This useful mineral forms large beds and masses in many parts of the world, and even composes entire mountains. It occurs in large columnar or in spheroidal concretions, and also crystallized in cubes. Rock-salt is subdivided by Werner into two kinds, foliated and fibrous. The more common colours of foliated rock-salt are, white, grey, reddish-brown, and red; but sometimes it is violet, sky-blue, and green, and is more or less transparent or pellucid: it breaks into cubical fragments, which have a vitreous lustre: the structure is indistinctly foliated. In fibrous rock-salt the fibres are generally small and curved; in other respects it differs little from the former. The taste of both is like that of common salt. The red varieties are coloured by earthy matter and oxyd of iron; the white and transparent are extremely pure, being composed almost entirely of muriatic acid and soda, or, according to Davy, of chlorine and sodium. In the purest kind also, there is scarcely any trace of water of crystallization. According to Henry, pure transparent rock-salt, calcined for half an hour in a low red heat, equal to four or five degrees of Wedgewood's pyrometer, lost absolutely nothing of its weight. It is remarkable, also, that if free from any adventitious moisture, it may be suddenly and strongly heated with scarcely any of that sound called decrepitation, which is produced by a similar treatment of all the varieties of manufactured common salt. The specific gravity of the purest specimens of rock-salt is about 2.170, of the less pure about 2.130.

Rock-salt is widely distributed over the globe; it appears principally in the lower secondary strata. It is most frequently accompanied with sulphate of lime or gypsum, and by beds of clay impregnated with salt. Beside the beds of rock-salt which are known, numerous brine-springs in various parts of the world attest the existence of this mineral deep under the surface, as it is evident these springs percolate beds of salt, or strata impregnated with it. Several brine-springs have recently been discovered in the deep coal-mines

of Northumberland and Durham. In the coal-mines near Ashby-de-la-Zouch, in Leicestershire, there are springs of brine 245 yards below the surface; and though these springs are in the centre of the island, they are 140 yards below the level of the sea. How much deeper their source may be, has not been ascertained.

The most obvious hypothesis respecting the formation of rock-salt is, the one which supposes that it was deposited from the sea, or by the deficcation of salt lakes which formerly covered the present continents. Against this it has been objected, that the composition of rock-salt is much more pure than the contents of sea-water, which contains a quantity both of muriate and sulphate of magnesia, sulphate of soda, and of sulphate of lime. Rock-salt is also found at great heights above the present level of the sea. These objections will, in a considerable degree, be invalidated by the consideration that whatever impurities there may be in sea-water, if the process of evaporation go on very slowly the salt will be crystallized nearly pure. Of this we have an instance in the species of salt made at Lymington, in Hampshire, called *salt cat*, which is gradually formed in the course of ten or twelve days, by spontaneous evaporation of the liquor which drains from the common salt. This salt is so pure (though evaporated from the most impure part, the mother water, or residue of sea-water), that 1000 parts contain only 12 of foreign impurities, or little more than one *per cent.* Thus if the deficcation of lakes or basins filled with salt water were very gradual, as it must be, except in the vicinity of subterranean fires, the muriate of soda or rock-salt would be crystallized before the other salts, which being more deliquescent might be separated and washed away. In this manner the sulphate of lime or gypsum, which exists in sea-water, and accompanies rock-salt, may also have been deposited, and being nearly insoluble would remain.

The occurrence of rock-salt deep under the earth, or high above the level of the sea, can scarcely form an objection to its formation from sea-water; for it is admitted by all geologists, and is proved by undoubted facts, that the ocean once covered our present continents. Now by whatever process the dry land was raised above the sea, whether by the elevation of the former, or the depression of the beds of the latter, extensive hollows and closed vallies must have formed lakes of salt water, from which the salt might be deposited by evaporation. Some of these vallies or hollows would occur in elevated situations. With respect to the beds of rock-salt placed under other strata, however difficult it may be to explain the formation of the secondary strata, the existence of organic remains in them prove that each stratum was once the uppermost part of the globe, and the strata by which it is covered were deposited upon it in successive and probably at distant periods. Nor is the difficulty greater with respect to the strata covering rock-salt, than the strata covering coal and beds of coal-shale abounding in vegetable impressions. No organic remains have indeed been discovered in the strata over the rock-salt of Cheshire, but they are commonly met with at greater depths over the rock-salt beds in Poland, and in other parts of Europe. The occurrence of rock-salt at the sides or feet of extensive mountainous chains, may perhaps illustrate its formation, as it is probable these extensive chains once formed the boundaries of inland seas or lakes, when the relative level of the ocean and our continents was very different from the present.

Rock-salt is not mined in any part of our island, except Cheshire, though it was bored through at Droitwich; and it exists, in all probability, in many of the

western counties through which the red sand-rock extends. We have proofs of its existence from the brine-springs at Droitwich, in Worcestershire, at Lemington in Warwickshire, and at Ashby Wolds, in Leicestershire; and also in the counties of Northumberland and Durham, on the eastern side of England. The springs at Droitwich furnish a brine as strong as those of Cheshire. A description of the rock-salt of Cheshire being given as an article of rural economy, we shall proceed to give a short account of the most important repositories of this useful mineral in other parts of the world.

Salt is very abundant in Africa; all the plains and sandy deserts are impregnated with salt, and the greater part of the springs in these deserts are so saline, that it is not possible to drink the water. To the south of Abyssinia, at the feet of the mountains which separate that country from that of the Gallas negroes, salt exists in dry and solid masses. The summit of the mountains which border the desert to the west of Cairo, presents an immense plain covered with a mass of salt. According to Horneman it is spread over so large a track of surface, that no eye can reach its termination in one direction; its breadth extends several miles. To the west of the desert of Sahara are the great salt rocks of Tegaza, on the south-east frontier of the desert of Zuenziga, a little distance from Cape Blanc. They are worked by the Moors. These salt mines furnish the white and coloured salt, which is carried by caravans to Casnah and Tombuctoo, to supply the Negro states; for it does not appear that there are any salt mines in Negro land properly called. The mines of salt spread in that part of Africa which the ancients called Libya, have been well indicated by Herodotus, and it is in this country that he has described buildings constructed of rock-salt, like those in Caramania and Arabia. Other salt mines, according to Park, are found on the southern frontier of the great desert Sahara. Their produce is also sold to the Negroes on the borders of the Niger and the Jolibe. In the kingdom of Tunis, mount Had Delfa is entirely composed of very compact salt of a red and violet colour. The lake des Marques, and the plains near it, also contain much salt. There are mines of rock-salt in the country of Bamba, in the kingdom of Congo. On all the western coast of Africa there are salt lakes and marshes. In the neighbourhood of the Cape of Good Hope, and in Caffraria, rock-salt is less common; but there are salt lakes to the east of the Cape, on the frontiers of Caffraria, which contain at the bottom beds of salt variously coloured.

Salt lakes exist in the Cape Verde islands, and natural salt-marshes, particularly in Bona Vista.

Spain is the only country in the south of Europe which contains extensive repositories of rock-salt in considerable masses above the surface. It is found there in elevated situations, forming entire hills: brine-springs also issue from the feet of the mountains which traverse that country. According to the description of Mr. Bowles, the repository of rock-salt which lies between Caparoso and the river Ebro, is in a chain of hills which extend from east to west. These hills are composed of lime-stone, mingled with gypsum, the chain extending more than two leagues. In the most elevated part is situated the village of Valtierra, on a slope towards the middle of which is found a bed of rock-salt. It may be about 400 paces long, and 80 wide. The salt is contained in a bed of about five feet in thickness.

"I examined," he adds, "with attention those beds of salt; I compared them with the layers of earth and gypsum in which it is imbedded; I found the outside layer to be composed of gypsum; and, immediately afterwards, I met with

two inches of white salt, succeeded by two inches of stony salt, and a layer of earth. I found others alternately composed of earth and salt to the very bottom of the mine, which is of gypsum, undulated like the other layers. The layers of saline rock are of a dusky blue, those of salt are white.

"This mine is considerably elevated above the sea, for you ascend continually all the way from Bayonne.

"The second hill is that of Cardona, in Catalonia, near the mountain of Montserrat, sixteen leagues to the N.W. of Barcelona, and a few leagues from the Pyrenees.

"The village of Cardona is situated at the foot of a rock of salt, which, from the sides of the river Cardonere, seems nearly mural. This rock is a block of massive salt, which rises from the earth about four or five hundred feet, without crevices, chasms, or layers. No gypsum is found near it. This block is about a league in circumference; and its elevation is equal to that of the surrounding mountains: as its depth is not known, it is impossible to say on what it rests.

"In general, the salt, from the top to the bottom, is white, though some parts are red; some is also found of a fine blue. There are also in Spain other repositories of rock-salt and saline springs. In La Mancha, at Almengranilla, there is a mass of salt similar to that of Cardona; it is seventy yards in diameter, mixed with sulphate of lime, and covered with the same stone, including crystals of red quartz; above which are siliceous pudding-stones, and a stratum of carbonate of lime."

The mines of rock-salt that are wrought at Poza, near Burgos, in Castille, are remarkably situated, being placed in a vast crater. A French traveller, M. Fernandez, found pumice-stones, puzzolana, and other volcanic productions there.

Rock-salt is likewise found near Aranjuez and Ocanna, in the transition hills between Sierra Morena and Madrid.

On the north side of the Pyrenées no beds of rock-salt have been discovered, but numerous brine-springs occur, particularly at Salies: in the department of the Lower Pyrenées the soil is calcareous, and sulphate of lime is found in the neighbourhood of the spring.

There are salt-springs at Salies, to the south of Thoulouse, also at Salins and Montmorat, in the department of the Jura; in the first of these the water contains fifteen *per cent.* of salt.

There are about twenty brine-springs in the department of La Meurthe, which contain, on the average, thirteen *per cent.* of salt. These springs are at no great distance from each other; some are at the foot of the chain of Jura, the others at the foot of the Vosges: the product of these brine-springs supplies Switzerland with salt. There are salt-springs in the department of Mont Blanc, in the midst of the Higher Alps. In the same department, near St. Maurice, there is a salt-rock near the region of perpetual snow, which is probably the highest situation in Europe where this mineral occurs. The rock consists of gypsum, intermixed or impregnated with salt, which is extracted by solution in water; the insoluble part remains porous and light. Various brine-springs also occur in other parts of France.

Though there are numerous brine-springs in the north of Germany, no beds of rock-salt appear on the surface, until we approach the circle of Austria and the neighbouring countries. The range of salt-rocks commences at Halle, in the Tyrol, passes through Reichenthal in Bavaria, and continues to Hallein in Salzburg, Halstadt, Ischel, and Ebenfel, in Austria, and terminates at Ausse in Styria.

The salt at Halle is worked in a peculiar manner: parallel galleries are run into the rock, in these dykes are formed, and water is let into them, where it remains from five to twelve months. When the water is saturated, it is drawn off in pipes, and the solution is evaporated.

On comparing the geological situation of the greater part of the beds of rock-salt and brine-springs, it will be seen that they occur most frequently at the foot of high mountainous chains. The mines of rock-salt in Transylvania, Upper Hungary, Moldavia, and Poland, may be cited in further proof of this. These mines are numerous, and very important from their extent, and the vast masses of salt they contain. They are found along the chain of the Carpathian mountains, and spread nearly in an equal degree on each side of the chain accompanying these mountains to the extent of more than two hundred leagues, from Wieliczka in Poland, towards the north, to Fokizian or Rymnick in Moldavia, to the south.

The strip of land that contains the salt-rock or brine-springs, is near forty leagues broad in some parts. In it may be reckoned about sixteen mines, that are worked for salt; forty-three indications of mines that have never been wrought; and four hundred and twenty, or four hundred and thirty, brine-springs.

The most remarkable of these commence in the north-east, and extend in a southerly direction, including those of Wieliczka, Bochnia, and Samber, in Poland; and some brine-springs in Buchovina and Moldavia, particularly near Oekna. On the south-west of the chain, following the same direction, are those of Sowa, near Eperies, in Upper Hungary; of Marmarosch, in Hungary; of Dees, Torda, Paraid, and Vissackna, near Hermanstadt, in Transylvania, &c.

The salt-mines of Wieliczka, near Cracow, and those of Bothnia, which appear to be a branch of them, have become celebrated from the accounts given of them by almost every traveller who has visited that country; many of their descriptions are too highly coloured. They are, indeed, very ancient, having been worked ever since the year 1251; but have nothing to distinguish them above others, except the extent of the works in the beds of rock-salt, the dimensions of which still remain unknown. The ground that covers the rock-salt is composed, like that over most other salt-mines, of alternate strata of sand, pebbles, and marl, including large blocks of salt. You go down to these mines by six shafts, of four or five yards in diameter. Various structures have been formed in the body of the salt itself. We find there a stable, chambers, and chapels, all the parts of which, as pillars, altars, and statues, are of salt. The shafts and galleries are perfectly dry, so that you are more incommoded by dust than dirt. There are springs, however, both of salt water and of fresh in these mines. It appears that the air is not so foul in them as in most salt mines; but the workmen do not reside in them, as some have asserted. In certain parts of the mine, hydrogen gas sometimes collects and explodes.

The salt is cut out in little ascending steps. It is formed into parallelepipeds, weighing about eighty or a hundred pounds, or into cylinders, which are put into casks. This mine produces about six thousand tons of salt every year.

According to the description of Dr. Townson, the salt in the upper mines does not form continuous strata, or rocks, but exists in immense detached blocks or masses, imbedded in marl. He gives the following account of the strata which cover the salt.

	Yards.
Vegetable soil - - - - -	4
Sandy clay - - - - -	10
Fine sand efferveſcing with acids - - - - -	7
Marle with ſand, containing fragments of ſand-ſtone	18
Sand-ſtone - - - - -	2
Marle mixed with falt, in ſmall particles and cubes	40

At the depth of forty yards in this marle the falt is found. The blocks of this mineral are of ſuch a ſize, that in paſſing through the galleries formed in them, ſometimes the upper, and ſometimes the lower end only of a block may be ſeen; but often, though the galleries are three or four yards high, the breadth can only be obſerved, and even in ſome places the blocks of falt form the ſides of the gallery for fifteen or twenty yards. Theſe blocks compoſe the upper bed of falt, and from them the whole of what is called the green falt is obtained. This falt, which is of a greeniſh or blackiſh hue, owes its colour to numerous fine particles of a ſubſtance which ſeems to be of the nature of argillaceous ſchiftus ſcattered through it. This variety of falt, on account of its impurity, is retained in the country for home conſumption. In this marle, alſo, blocks of ſand-ſtone are ſometimes found imbedded, and the marle itſelf is ſtrongly impregnated with falt. Lower down there is another bed of falt, called ſzybicker falt, which is in ſome places two or three yards thick; it is of a purer quality than the former, and is exported to foreign countries. This variety of falt-rock is diſpoſed in very extenſive beds. The mine has been driven in one place twelve hundred yards, from eaſt to weſt, and four hundred from north to ſouth; falt being ſtill found there. The utmoſt extent is yet unknown. The nature of the ſtratum beneath the ſzybicker falt has not been aſcertained; for the miners, being apprehenſive of increaſing the quantity of water, have never proceeded to a great depth in this ſtratum. The greateſt depth of the mine is two hundred and forty yards. It does not appear that the remains of organized bodies have been found in great abundance in the ſtrata connected with the falt-rocks now deſcribed. None have been obſerved, according to Dr. Townſon's information, in the ſzybicker falt, or the lower ſtrata; but ſome have been ſeen in the marle which envelopes the block of green falt; ſuch as bivalve ſhells, at the depth of ſeventy-two yards; crabs' claws, at the depth of eighty yards; and charred coal, mixed with falt and gypſum, at the great depth of two hundred yards.

From the circumſtance of maſs being formerly celebrated in theſe mines two or three times a week, it has been ſaid that the workmen, to the amount of five hundred, live conſtantly below ground. They do not, however, continue longer than their hours of working. To keep the mines dry, the falt water is drawn up in leathern ſacks, and is thrown away; the ſmall quantity of freſh water which they afford is reſerved for the uſe of the horſes which are employed in the ſubterraneous operations. At the time Mr. Townſon viſited them, twenty-four horſes were conſtantly kept below ground.

In the mine of Bochnia the falt preſents itſelf in a ſtratum at once, and not in detached pieces. The ſtrata of clay, as well as thoſe of falt, are undulated, and not of an uniform thickneſs. The falt is ſometimes brown, at others reddiſh, and at others transparent. The different coloured falt is not arranged in parallel layers. The ſtrata dip at an angle of about forty degrees with the horizon. Dr. Townſon informs us that very beautiful ſpecimens of fibrous muriate of ſoda are found in it.

At Thorda the maſs of falt is divided into horizontal

but undulated ſtrata. Theſe ſtrata are about eight or ten inches thick. The loweſt are the moſt undulated.

Near Oekna, in Moldavia, there is a hill of rock-falt, in many parts of which the falt appears expoſed to view.

The mines on the ſouth-eaſt of the Carpathian chain appear more numerous, and are diſperſed through a greater ſpace of ground than thoſe on the north-eaſt. They are in general very near the ſurface. Some of thoſe in Tranſylvania are ſo to ſuch a degree, that perſons are appointed to cover the falt with turf, when it is waſhed bare by the rain. Theſe maſſes, however, are ſo thick, that their bottom has never been found. They are not worked to the depth of more than a hundred and ſeventy or eighty yards, becauſe the extraction of the falt becomes then too expenſive. In the county of Marmaroſch they have been wrought to the depth of upward of two hundred yards. Theſe mines contain likewiſe a great deal of petroleum, and the ground in which they are contained is every where furrowed by rivers. The mud interpoſed between the water of theſe and the falt, is imagined to prevent the falt from being diſſolved by them.

At Paraid, in Tranſylvania, there is a valley, the bottom and ſides of which are of pure falt. Walls of falt appear there ſixty or ſeventy yards high.

The mine of Eperies is three hundred and ſixty yards deep.

In the falt mines of Marmaroſch, water has been found included in the ſubſtance of the falt-rock.

The mines of the ſouth-weſt of the Carpathian mountains are generally wrought by means of ſhafts. There are at leaſt two to each mine; one for the workmen, the other for drawing up the falt. The falt is cut out in aſcending ſleps, which produces empty ſpaces, of a conical form, in the miſt of the ſtrata. The ladders reach perpendicularly to the bottom of this conical ſpace: ſo that within it they ſtand perfectly detached. Thus the greater part of the body of falt is extracted, leaving empty ſpaces, which are conical, and which communicate with one another by means of galleries. It has been thought, that, in order to leave leſs falt, it would be better to give theſe ſpaces the ſhape of a parabola. The falt is ſo plentiful, that the miners are paid only for ſuch pieces as weigh upwards of eighty pounds, the others being rejected as uſeleſs. When the workmen are incommoded by water, it is drawn up in leathern bags, to be emptied out of the mine.

The Tranſylvanians and Moldavians extract falt from their brine-ſprings, by throwing the water on wood fires, as the Gauls and Germans did in former times.

No falt-mine, or brine-ſpring, is known either in Sweden, or in Norway.

There are a great number of both, and particularly of falt lakes, in Ruſſia. Among theſe is the falt lake of Tor, towards the northern extremity of Little Tartary.

There are ſimilar falt lakes in the Crimea.

At Balachna, on the banks of the Wolga, are ſome very rich brine-ſprings.

In Ruſſia, in Aſia, we find the brine-ſprings of Permia, of which there are a great number at the foot of the mountains of Poyas.

About eighty verſts from Yena Taycoſka, in the deſart between the Wolga and the Uralian mountains, there is a mine of rock-falt.

In the government of Altraean, to the north of the Caſpian ſea, in the environs of Orenburgh, and in the country of the Baſhkirians, falt lakes are very common, and the water evaporating during the ſummer, the falt appears

appears crystallized on their surface, and round their borders. When this water is highly concentrated, it has a deep red colour. The salt formed in them has often the same hue; and when this is the case, it diffuses a very perceptible violet smell.

One of these is the salt lake of Elton, above Astracan, in the re-entering angle formed by the Wolga. The Kal-mucks called it the Golden lake, because of its red appearance, when the sun shines on it.

The lake of Bogdo, situate near this, yields a perfectly white salt, free from sulphate of magnesia, and preferred to that of lake Elton.

Near Astracan, too, is the mine of Iletzki, celebrated for the quantity of salt it furnishes. The salt lies at no great depth, and rests on a very hard clay. The soil above it is sandy, and full of holes, containing water saturated with salt.

In Siberia there is a mine of rock-salt on the right bank of the Kaptendoi; and on that of the Kawda are fourteen brine-springs. Others are found in the government of Kollivan, and in the environs of Irkutsk, near the lake Baikal, in the centre of Asiatic Russia. Lastly, the country near the Caspian sea is so impregnated with muriate of soda, that in the environs of Gourief, the fogs and dew that settle on people's clothes, and on plants, are saline. Pallas.

Among the Mongul Tartars, the soil is so thoroughly penetrated with muriate of soda, that the people lixiviate it, and evaporate the solution to obtain salt.

That part of China, which borders on Tartary, contains salt-mines, and the ground is strongly impregnated with salt.

Salt is found in the same manner throughout almost the whole table-land of Great Tartary, Thibet, Hindooistan, and particularly Persia, where very extensive plains are seen covered with a saline efflorescence. The isle of Ormus, at the mouth of the Persian gulf, appears, according to the accounts of travellers, to be one large rock of salt. This substance is also found in solid masses near Balach, on the eastern side of Persia. In the desert of Caramania, according to Chardin, rock-salt is so abundant, and the atmosphere so dry, that the inhabitants use it for building their houses. It is found in the neighbourhood of Ispahan, and in the mountains to the north of that city.

The repositories of rock-salt in America are less known. According to Ulloa and others, it is found in vast quantities in the elevated deserts of Peru, at the extraordinary height of 10,000 feet, or more, above the present level of the sea. It is extremely hard, forming solid, continuous rocks of a dull violet colour.

The mountain of Xaragua, in the island of St. Domingo, affords salt; and in the same island there is a very remarkable salt lake, about 22 leagues in circumference, called Henriquelle. The water, which is inhabited by lizards, alligators, and land-tortoises, all of a large size, is deep, clear, bitter, salt, and of a disagreeable smell. Near the middle of the lake is an island, about six miles long and three broad, well stocked with goats, whence it has the name of Cabrito island; and in this island is a spring of fresh water.

Salt lakes occur in other of the West India islands. In North America, west of the Alleghany mountains, in the state of Kentucky, are numerous repositories of rock-salt and brine-springs: these are called *licks*, where the elks and buffaloes formerly repaired in herds, to lick the soil impregnated with rock-salt. On the western side of the great river Missouri, a chain of mountains extends 80 miles in length, and 45 in breadth, and of considerable height: it consists of pure rock-salt, barely covered with earth, but

without any tree or shrub. Further west, in California, salt is found in a very pure state, in large and solid masses.

From the preceding account it will be seen that this most useful mineral is found in every quarter of the globe; and in many parts it exists in masses of immense size and extent, compared with the rock-salt in our own island, in the county of Chester. Such, however, is the superior industry of our inhabitants, that the quantity annually exported from that county alone greatly exceeds that procured from any other district in the known world, being not less than 140,000 tons, the produce of the salt-rock and brine-spring; while the celebrated mines at Wieliczka, in Poland, are stated to yield only about 6000 or 7000 tons. Where rock-salt is white or colourless, it is immediately applicable to all useful purposes; but when mixed with earthy matter, it is rendered pure by the simple process of solution in water. The liquor is afterwards drawn off into pans, leaving the insoluble part behind; and the water is then evaporated either by the natural warmth of the climate, or by fires. See SALT.

Rock-Salt, in *Rural Economy*, that sort of fossil, rocky, saline material, which is dug out of the bowels of the earth, from different depths, in some parts of this and other countries, where it exists in layers of different thicknesses. The beds of this kind of salt, which are found in the county of Chester, are highly interesting and important to the country, whether considered as affording an article of manufacture and commerce, or as forming a source of revenue. The discovery of the beds or strata of this sort of matter, in this district, is, however, of no very remote date, as will be seen under the head of *Rock-Salt Pits*; but the layers are pretty numerous, and of considerable extent, differing greatly in their purity, though, in many instances, requiring a greater or less degree of preparation before the salt can be used.

It is remarked by the writer of the account of the Agriculture of Cheshire, that, from some experiments made on different specimens of rock-salt, it would appear that the transparent kind of it is an almost pure muriate of soda, which contains no admixture of either earth or earthy salts; and that the colour of the less transparent and brown specimens is derived from the earth that enters, in greater or less proportions, into their compositions. That on 480 grains of transparent rock-salt being dissolved in four ounces of distilled water, there was, first, no precipitate let fall, on the addition of carbonate of potash. Secondly, no alteration was produced by this solution on blue vegetable juices. Thirdly, on the addition of a few drops of tincture of galls, a slight purple tinge was given to the solution; and after standing some hours, there was a brown sediment at the bottom of the vessel. Fourthly, on the addition of muriate of barytes, there was no precipitate thrown down. From the first of these trials, it is supposed that rock-salt has no muriate of lime, or muriate of magnesia, combined with it; from the second, that it has no uncombined acid or alkali; from the third, that it contains some portion of iron; and from the fourth, or last, that there is no sulphate of lime contained in it.

And that, on examining different specimens of the less transparent, and the brown rock-salt, with the same reagents as in the above trials, it was found that these consisted of muriate of soda, or sea-salt, in combination with a certain proportion of earth, varying in quantity from one to thirty *per cent.*; also, that the earth was wholly the argillaceous or common clay; but that some of the specimens contained a few grains of sulphate of lime, in 480 of those of the rock-salt.

The beds of this salt are now well known to be the principal

cipal cause of the salt-brine springs in this county; and, in connection with some other circumstances, to have a great share in causing the vast differences in their strength, in different places. See *SALT-Brine Springs*.

This is a strong sort of salt, which is found useful for a variety of domestic purposes, according to the different manner in which it is prepared, or the difference in the size of the particles or crystals of which it is composed, as will be more fully shewn under the head *SALT*.

Although rock-salt is found in various parts of the above district, there are no pits of it wrought at present, except in the vicinity of Northwich. And part of the inferior rock-salt, which is procured there, is, it is said, used at some of the refineries in that neighbourhood; and a further quantity sent down the river Weaver, for the supply of the refineries at Frodsham, in the same county, and those on the banks of the Mersey, in Lancashire. The purer rock-salt, or that which is called in general Prussian rock, is carried by the same conveyance to the port of Liverpool; whence, according to the above writer, it is exported chiefly to Ireland, and the ports of the Baltic. The annual quantity of rock-salt sent down the first of the above rivers is found, on the average of the last ten years, to be 51,109 tons. But in this, it is observed, is included what is used at the Frodsham and Lancashire refineries, which may probably be about one-third of the whole. And it is added, that it appears, from the report of the committee of the house of commons, appointed to inquire into the laws respecting the salt duties, printed in June 1801, that,

in 1798	} were exported	{	20,162	} tons of rock-salt.
1799			33,913	
1800			34,939	

Of this quantity,

in 1798,	-	-	16,095	} tons
1799,	-	-	22,374	
1800,	-	-	19,663	

were sent to different ports in Ireland; the remainder was principally exported to Denmark, Russia, Sweden, Prussia, and Germany. However, a small quantity went to Guernsey, Jersey, and the West Indies.

This shews, in a striking manner, the great utility and advantage of this article in a manufacturing and trading point of view, as well as in other ways.

In regard to the original formation of the beds or strata of rock-salt, in this and other countries, different theories, opinions, and conjectures, have been formed and proposed; but it is one of those geological questions which is extremely embarrassing in its nature, and very difficult in its solution. Mr. Holland has, however, in the above work, ingeniously stated several suppositions on the subject, and the objections to which they are exposed. It is remarked, that wherever rock-salt is met with, sulphate of lime seems to be very generally discovered in mixture with the earthy strata above it. And the writer of the "*Memoire sur le Ser Marin*," in the 11th volume of the *Annals of Chemistry*, it is added, informs us, that this is the case in Poland, Transylvania, and Hungary; also, that there is commonly a layer of gypsum betwixt the strata of stone and the bed of salt. This gypseous layer is of different colours, and is found crystallized, striated, and mixed with marine shells. The gypsum above the beds of rock-salt in Cheshire is, in like manner, found crystallized and striated; but no marine exuvia, or organic remains, it is observed, are ever met with in any of the strata. Nor does gypsum accompany it, as is usual in other places, as near Cordova, in Spain, where

rock-salt forms a mountain 500 feet in height, and three miles in circumference, as noticed by Kirwan and Townshend. Jars, the author of the "*Voyages Metallurgiques*," who, it is asserted, has given the most particular account we have of the upper stratum of rock-salt about Northwich, remarks, that "it appears to have been deposited by layers or beds of several colours;" and that "these layers of salt are in such a position, as to lead us to believe that the deposition of it was made in waves, similar to those which are formed on the sea-coast."

This, Mr. Holland says, coincides with an opinion suggested by Mr. Stanley, a friend of his, in regard to the probable origin of the beds of rock-salt, now in existence in this district; who states that rock-salt is there found in several strata, one above the other, with intermediate beds of indurated clay, in the vallies of the Weaver, and those of the other rivers and brooks emptying themselves into it; but that it has never been found so near the surface, as to be above the level of the sea, or beneath any solid rock. If beds of rock-salt are to be considered as so many deposits of salt from sea-water, we must suppose the sea, at some former period, to have occupied the vallies in this county; and that, from time to time, the communications were interrupted between these vallies (then deeper than they are now) and the sea. Earthquakes, or accumulations of sand in the estuaries of the Mersey and the Dee, might, it is contended, have caused the interruptions. Whenever the sea-water in the vallies became separated from the sea, the salt contained in it would subside, by the natural process of evaporation. This, it is supposed, would the more easily have taken place, if, by any subterraneous fermentation, the ground below the water should have been heated. To account for a greater accumulation of salt than the sea-water filling all the lowest parts of the district would contain, we must suppose, it is said, that the obstruction interposed between the vallies and the sea had been repeatedly broken down, and renewed again. Tides, unusually high, might occasionally overcome the resistance of the accumulated sand; and if the intervals between the inundations were only of short duration, a subsidence of salt might take place, equal to the formation of the thickest stratum of the rock-salt now existing. Long intervals between the inundations would admit of an accumulation of clay, and other earthy particles, over the salt thus deposited; and in this manner would be formed a new basis for another stratum of rock-salt to repose upon. Thus, it is thought, the regular and astonishing existence of the salt strata may be accounted for, without necessarily supposing them coeval with the original formation of the earth: but to confirm the theory, it is suggested that much observation and close inquiry into the natural history of the county would be required.

Mr. Holland, however, justly thinks that there are many objections to the theory which supposes the beds of rock-salt, in this district, to have been formed by deposition from the waters of the sea; some of which he states rather for the sake of promoting discussion and inquiry, than of affording any very decided opinion on a matter of so much doubt, uncertainty, and obscurity. Though on making a perpendicular section of the upper bed of rock-salt, an irregular stratification, such as noticed by Jars, may, he says, by frequent accurate examination, be observed, the general appearance of the sides of the openings, whence the rock-salt is taken, is that of a confused and irregular red mass; in which some portions of salt have a greater, others a less, proportionate admixture of earth; while, here and there, they may be seen perfectly pure and transparent. He, therefore, asks, is it likely that this irregularity and confusion

sion would have existed, had the beds of rock-salt in this district been formed by the evaporation of sea-water inundating the land at certain intervals of time, as the above theory supposes? On the contrary, says he, would it not be natural to expect from reasonings, *à priori*, that the salt, thus deposited from sea-water, would be disposed in layers perfectly regular, and differing from one another merely in thickness, or a few other circumstances of inferior moment?

Another fact which, it is supposed, invalidates, in some measure, the notion that the rock-salt has been deposited from the waters of the sea, is the great disproportion of quantity, shewn by analysis to exist, between the earthy salts contained in the brine of this district, and those held in solution by sea-water; the ratio here being as one to ten, or the proportion which the earthy salts bear to the pure muriate of soda in sea-water is ten times greater than that which prevails in the Cheshire brine. The ascertaining of this fact proves, it is supposed, that the rock-salt (from the solution of which the brine is formed) is combined with a much smaller proportion of earthy salts than exists in sea-water; a circumstance difficult to be accounted for, on the supposition that the beds of this substance were formed by the evaporation of the sea-water, occupying the vallies and lowest parts of the land. It must be noticed, however, as worthy of attention, that the earthy salts, intermixed with the rock-salt in the above district, are the same which are held in solution by sea-water, being principally muriated magnesia and sulphate of lime.

There is, however, a still stronger proof, it is supposed, against the notion that the beds of rock-salt in this county are depositions from the sea-water, in the circumstance that no marine exuvie have ever been discovered in the strata. This, it is imagined, would almost indubitably have been the case, had the land been covered with sea-water during a period of sufficient length for the deposition of beds of salt of such prodigious thickness; and the fact, that no such exuvie do actually exist, is supposed in itself sufficient to induce a suspicion that the theory in question cannot be well founded. Other objections too, it is observed, offer themselves to its validity; such as the enormous depth of sea-water necessary to the production of a body of rock-salt forty yards in thickness; the difficulty, if not impossibility, on such principles, of accounting for the formation of the singular insulated mountain of rock-salt at Cordova, in Spain; with others of a more trivial nature, which will readily present themselves in this inquiry.

It is, however, at the same time candidly acknowledged, that there are many facts and circumstances of actual observation, that confer a strong degree of plausibility on the opinion, against which it has been contended. The certainty that the surface of the county was at some former period much lower than it is at present, and the diminution of the thickness of the strata of rock-salt in proportion as they recede from the sea, are circumstances which undoubtedly range themselves on this side of the question; and, upon the whole, it is thought, that it may be doubted whether the theory, which regards the beds of rock-salt as deposits from sea-water, does not accord more exactly with existing appearances, than any other which has been adduced on the matter.

It is supposed that many things, which at first seem objections, may be obviated by a reference to the principles of the Huttonian theory of the earth, and the excellent illustrations of it by professor Playfair. However, in the present state of our knowledge, any opinion formed on the

matter must, it is imagined, from its very nature, be purely theoretical. See *Rock-Salt Pits*.

Rock-Salt Pits, such pits, shafts, mines, or openings, as are dug or made in any other manner in the ground, for the purpose of getting and raising rock-salt from them. Pits of this sort are met with in many parts of the county of Chester, which are wrought to very considerable extents, and are of great importance to the interests of the district in many different ways, as well as to the nation in general, as may be seen under the head *Rock-Salt*.

According to the statement of Mr. Holland, in his Agricultural Survey of the above county, the first bed and pit of salt-rock was found and wrought in Marbury, at a small distance from the town of Northwich, at the depth of about thirty yards from the surface, in the year 1670, when searching for coal. The bed was thirty yards in thickness, and rested upon a stratum or layer of hard clay. In consequence of this discovery, other similar attempts were made; and on sinking shafts or pits any where in the vicinity of it within the space of half a mile, it was found to exist at about the same depth from the surface of the earth, when not prevented from being dug down to by brine-springs or those of common water. This continued the only place in which it was found until the year 1779, when this sort of rock was again met with in searching for brine in the neighbourhood of Lawton, at the depth of about forty-two yards, but only of the thickness of about four feet; there being beneath it a bed of indurated clay ten yards in thickness, which being penetrated through, a second stratum of rock-salt was discovered twelve feet in thickness; and on continuing the sinking of the pit, another layer of indurated clay, fifteen yards in thickness, was passed through; below which appeared a third stratum of rock-salt, which was sunk into not less than twenty-four yards; the lowest fourteen yards, being the purest, or the least mixed with other substances, were the only parts that were wrought.

Until this period, in the neighbourhood of Northwich, no attempts had, however, been made to sink pits in order to find a lower stratum of rock-salt; as the one which had been first met with was so thick, and furnished such an abundant supply for every demand, there could be no other inducement to this than the expectation of meeting with a stratum, at a greater depth, which might contain a less admixture of earthy matters. It would seem, too, that the fear of meeting with springs below, which might impede the working out of the materials from the pits, and even render this wholly impracticable, prevented the proprietors of them from sinking deeper. As, however, no inconvenience or interruption of this nature had occurred, on sinking through different alternate strata of rock-salt and clay at Lawton; and it had been found that there was a lower stratum of rock-salt there, which was more pure than those nearer the surface, the owners of one of the works or pits in this vicinity were induced, a little time after the trials at Lawton, as in 1781, to sink deeper than had yet been done, and to pass through the bed or body of indurated clay lying underneath the rock-salt, which had been so long known and wrought. This indurated clayey material was found to be from ten to eleven yards in thickness; and immediately beneath it a second stratum of rock-salt was met with, the upper part of which differed little in purity from that of the higher stratum or layer of rock; but on penetrating into it to the extent of from twenty to twenty-five yards, it was there found to be much more pure and free from earthy admixture.

ture. But it continued to have this increased degree of purity for four or five yards only; while, for fourteen yards still lower, to which depth the pit or shaft was sunk, the proportion of earthy matter was again as large as in the upper part of the stratum. It was therefore, on this account, thought useless to sink the pit to any greater depth. Many other proprietors of pits, shafts, or mines, in the same neighbourhood, it is stated, followed the example which had been thus set them; and penetrated through the bed of indurated clay lying beneath the upper stratum of rock-salt. A second stratum of rock-salt was constantly met with below this; and on passing down into it, the same order of disposition as to purity was observed, as in the pit or mine in which it had been first noticed and examined; and the same has been found to prevail in all the pits, shafts, works, and mines, which have since been sunk in the same vicinity.

It is further noticed, that there is great uniformity in the strata which are passed through in sinking pits for rock-salt or brine; and that they very generally consist of clay and sulphate of lime mixed in various proportions; that of the latter somewhat increasing as the pit, shaft, or work approaches the rock or brine. The workmen distinguish the clay by the appellation of *metal*, giving it the name of red, brown, or blue metal, according to its colour; and the sulphate of lime by that of *plajfer*. See QUARRY.

The strata formed by these are, in general, close and compact; allowing very little fresh water to pass through them. In some places, however, they are broken and porous: and they admit so much fresh water into the pit or work, that whenever they have been met with, it has been usual to discontinue any attempts to pass through them in sinking the pits. In these places the workmen call the metal *jaggy*. It was thought not only impracticable to overcome a water, which vulgar prejudice had magnified into a great stream running under ground; but it was believed, even if the sinking could be continued below this, that the water could not be kept out of the pit, shaft, or work, and that it would either weaken the brine so as to destroy its value, or would find its way into the cavity of any rock, pit, or mine which might be found below it. Later experience, it is said, has proved, that these ideas were not altogether well founded. A few years ago an attempt was made in Witton to pass through this porous stratum, in order to get to the brine. It was met with about twenty-eight yards from the surface; the thickness of it was about thirteen feet; and the quantity of water, which was forced through it into the pit or shaft, was three hundred and sixty gallons a minute. By means of a steam-engine, the sinkers were enabled to pass through this water; to fix a gauge or curb a few yards below it, in a stratum of indurated clay; and thence to bring up a wooden frame, supporting a wall of puddled earth twelve inches thick, by which the access of the fresh water into the pit or shaft was in a great degree prevented, and an opportunity given to pass down to the brine below. A shaft was afterwards sunk through this porous stratum, for the purpose of obtaining rock-salt; which object was, after a short time, defeated, by the influx of brine into the shaft at the surface of the upper stratum of rock-salt; an accident originating in a cause completely distinct from the fresh water in the porous stratum or bed. An exact section of the different strata sunk through in reaching the second bed of rock-salt in the pit at Witton, near Northwich, is given by Mr. Holland in the above report; and all the strata in

the neighbourhood of the last town are supposed to have nearly a similar disposition. The inclination of them in the pit or shaft at the above place was from north-west to south-east; and the dip about one yard in nine. The stratum through which the fresh water flowed is shewn, and the level it found, it is said, was sixteen yards from the surface, which, it is remarked, nearly corresponds with that of the brook below. The line of separation between the lowest stratum of earth, and the first of rock-salt, is very exactly defined; they are perfectly distinct, and do not at all run into each other. It is farther noticed, that in carrying a horizontal tunnel for one hundred yards along the upper stratum of rock-salt, this was found to be irregular and unequal on its surface; the irregularities in a great measure corresponding with those on the surface of the ground above.

The highest bed or body of rock-salt in the pits near Northwich is the thickest in those situated the most to the north-east, gradually declining in thickness towards the south-west, so as to lose one-sixth of it in the course of about a mile. It decreases from about thirty yards in those the farthest to the north-east, to about twenty-five in that the most to the south-west.

A singular appearance is remarked to present itself on making a horizontal section of the stratum of rock-salt in the pits: on the whole of the surface made by such a section, various figures, it is said, may be observed, differing in form and size, some of them being nearly circular, others approaching more to an oval form, while in many an irregular pentagon may be traced. Some of them are not more than two or three feet in diameter; others are ten or twelve feet. The lines which form the boundaries of these figures are white, and from two to five or six inches wide. On examining these appearances, they are found, it is said, to be owing to the rock-salt, in the white lines forming the divisions of the figures, being perfectly pure, and free from earthy admixture. When combined with the salt, having earth in various proportions mixed with it, a general effect is produced, it is said, not very distantly resembling mosaic work. This disposition is uniformly observed, it is said, throughout the whole thickness of the stratum of rock-salt; and that in whatever part of it such a section as the above is made, similar appearances are met with. To what cause it has been owing that the rock-salt has been deposited in this singular manner, it is thought difficult to conceive. The whole stratum of rock-salt may, it is supposed, be compared to a mass of basaltic columns; the lines of separation in each pillar being marked by the pure and transparent white salt. These appearances, it is noticed, afford several grounds for inferences favourable to the theory of the earth mentioned under the head rock-salt, to the illustration of it. See *Rock-Salt*.

It is likewise further observed, that the division betwixt the lower portion of the upper bed of rock-salt, and the indurated clay or stone beneath it, in pits of this kind, is as exactly defined, as that between the upper portion of it and the earth above. That in passing through this stone small veins of rock-salt are met with, here and there running in it, in various directions; and that wherever there has been any little crevice in it, it is found filled up with rock-salt, to which the clay and oxyd of iron have given a deep red tinge. The thickness of this stratum of stone is said to be uniformly found to be from ten to eleven yards; and the lower part of it is as distinct from the second bed of rock-salt, as its upper part is from the first: also that its termination is equally abrupt or sudden.

And that the perpendicular section of the second bed of rock-salt varies little from that of the upper bed, till it has been penetrated about twenty yards from the surface, when it assumes a more stratified appearance, and is here found, as already noticed, to have a much smaller proportion of earth combined with the muriate of soda. A section of this stratum, similar to the above, displays the same figured appearance in the roof of the pit, as that of the upper stratum.

In the very instructive report mentioned above, the writer has given a coloured representation of the roofing of a rock-salt pit, and another of the part where the lower surface of the upper bed of rock-salt joins the inferior clayey or other strata. These, as well as other matters in that work, are particularly worthy of the attention of the inquirer on this subject.

But though beds of this sort of material have been occasionally met with in some other parts of the same district, they have not been wrought, principally on account of the want of water carriage: as the working of those pits at Lawton was soon discontinued, it is now only from the pits in the neighbourhood of the town of Northwich that rock-salt is procured. At this time there are ten or twelve in number; at all of which the rock is wrought in the lower stratum or bed only. The pits or shafts are for the most part square, and built or formed with timber; but there is one at the distance of about a mile from the town of Northwich, which is of a circular form, and built in brick-work.

In regard to the manner of working the pits or mines, there is nothing of any very great interest or moment to be noticed. By means of boring and blasting the rocky stratum, and the use of wedges with the different mechanical instruments employed in mining, the salt-rock is separated, so as to be raised in large masses, which vary in form and purity. However, before any considerable extension of the workings in the pits, in any particular direction, takes place, care is taken to make sure of a good safe open roofing for the cavity which is to be formed in getting out the rock. In doing this the workmen make use of pointed implements of the common pick kind, working the materials out in an horizontal manner, so as to form an excavation in the rock, and making it in as simple a way as possible, or as the work will admit. In consequence, however, of its being situated a few feet above the purer part of the stratum, the rock which is obtained during this process is commonly of inferior quality, and is, for the most part, made use of in the refineries. The depth of the workings from the excavations or roofings, it is remarked, depends in a great measure upon the nature of the stratum, and the proportion of it occupied by the rock of the purer quality, or, as it is termed, *Prussian rock*. Fifteen or sixteen feet may perhaps, however, be taken, it is thought, as the average depth of the workings in the pits. The cavity thus formed presents a striking appearance; and when illuminated by candles fixed in the rock, the effect, it is asserted, is highly brilliant. In some of the pits or shafts, the excavated roofs are supported and kept up by pillars eight or ten yards square, which are in general arranged with a degree of irregularity: others are worked out in aisles; the choice here however seems to be wholly arbitrary, depending on the men who are employed in the work. Until these few late years, horse labour was wholly employed in raising rock-salt from the pits and shafts about the town of Northwich; but this method has now, in some measure, given way to the best kind of steam-engine, which

has been substituted in its stead, in many of them with very great advantage. In others, however, horse labour is still continued to be made use of for this purpose. The men who are employed in working the rock-salt pits, have their pay by the quantity of the material which they raise, having in general somewhat less than half a crown for the ton weight, they finding tools and every thing else necessary for the work.

Rock-Fish Creek, in *Geography*, a river of Virginia, which runs into James river. At the mouth of this river is a precipice, hanging over a navigable part of the river, formed of marble, variegated with red, blue, and purple. N. lat. $37^{\circ} 37'$. W. long. $78^{\circ} 54'$.

Rock-Castle River, a river of Kentucky, which runs into the Cumberland, N. lat. $36^{\circ} 43'$. W. long. $84^{\circ} 14'$.

Rock Point. See *PUNTA de Culenduras*.—Also, a cape on the N. coast of the island of Cumbava. S. lat. $8^{\circ} 8'$. E. long. $118^{\circ} 35'$.

Rock River, a river of America, which runs into lake Michigan, N. lat. $37^{\circ} 37'$. W. long. $83^{\circ} 35'$.

Rock Town, a town of Africa, on the Grain Coast. N. lat. $4^{\circ} 35'$. W. long. $7^{\circ} 50'$.

ROCKAWAY, a small post-town of America, in Morris county, New Jersey, on the S. side of a river of the same name; 15 miles N. by W. from Morristown.

ROCKBENT, a township of Pennsylvania, in Lancaster county, containing 1026 inhabitants.

ROCKBRIDGE, a mountainous county of Virginia, bounded N. by Augusta, and S. by James river, which divides it from Botetourt county. It contains 10,318 inhabitants. The famous natural bridge is in this country. Here is an useful academy, for twenty to forty students, liberally endowed by the late general Washington, and called, after him, "Washington Academy." The chief town is Lexington.

ROCKCASTLE, a county of Kentucky, containing 1731 inhabitants.

ROCKEN, a cape on the S. coast of the Isle of Wight. N. lat. $50^{\circ} 34'$. W. long. $1^{\circ} 13'$.

ROCKENBACH, a town of Germany, in the principality of Culmbach; 5 miles N. of Neustadt.

ROCKENHAUSEN, a town of France, in the department of Mont Tonnerre, and chief place of a canton, in the district of Kaiserslautern; 10 miles N. of it. The place contains 940, and the canton 5129 inhabitants, in 17 communes.

ROCKENHOF, a town of Germany, in the territory of Nuremberg; 8 miles N.N.E. of Nuremberg.

ROCKET, in *Pyrotechny*, an artificial fire-work, consisting of a cylindrical case of paper, filled with a composition of certain combustible ingredients; which being tied on a stick, mounts into the air to a considerable height, and there bursts.

The rocket has a great part in all fire-works of entertainment, being not only used singly, but sometimes also as an ingredient in others.

Besides the rocket here defined, which is properly called the *sky-rocket*, there is another, which, from the sphere it moves in, *viz.* the water, is denominated *water-rocket*. For the mechanism, preparation, &c. of each of them, we refer to the article PYROTECHNY.

Dr. Pemberton, in his *Chemistry*, p. 209, &c. has given the following concise account of rockets. A rocket (he says) is a hollow cylinder, usually made of paper, of a thickness equal to about one-sixth of its diameter within, and filled with gunpowder, or some like composition. It

ROCKET.

a rocket be made of great bigness, intended for a signal in war, or such like use, its case may be made of a more solid material.

Near one end the case of the rocket is drawn in, till its diameter be reduced to one-half of the whole internal diameter. This place is usually called the choke. The most approved length of the case, from the choke, is about six times its internal diameter, to be filled with gunpowder; if the rocket be small, beat into fine dust, and rammed in with as even strokes as can be, that the powder be uniformly compressed. In great rockets, the charge is usually a little weakened by adding to the gunpowder a small portion of charcoal and of sulphur.

To the end of the rocket is added a cylindrical cavity, not above half the length of the rocket from its choke in height, and of such a diameter, that, together with the materials put into it, it may not exceed the weight of the rest of the rocket. These materials, besides some corn powder to burst the case, consists of some composition, that may give the appearance of stars, a shower of fire, or the like.

These fiery showers may be made of saw-dust, boiled in water, strongly impregnated with nitre, and while wet rolled among gunpowder in dust; or by gunpowder mixed with melted brimstone, and when cold, grossly beaten.

These stars are a mixture of gunpowder, nitre, sulphur, antimony, camphor, and the like combustible materials, moistened with a solution of some gum, in order to form pellets of a convenient size. These pellets are to be covered over with thread, well soaked in a strong solution of nitre, and while wet rolled in gunpowder. To charge the rocket with larger balls, any of the aforesaid ingredients (of which nitre, in a sufficient quantity, must always be one) may be mixed with turpentine, melted pitch, or rosin, and tow steeped in it. In this way larger balls may be formed, which should be covered over with thread, prepared as just now described.

It is necessary for giving the rocket a sufficient degree of motion, that the powder within the rocket be bored with a tapering cavity from the choke. At the choke this cavity must be as wide as the choke itself; at the farther end it need not be more than one-half that width. The length of this bore must be but one inner diameter of the rocket short of the whole height to which the rocket is rammed. The use of this bore is to increase the surface, that takes fire at once; that a greater body of fire may issue out of the mouth of the rocket. For from the vehemence with which the fire issues out, the rocket receives its motion. Rockets are used in all fire-works that have motion, except such as are thrown into the air after the manner of bombs. When the rocket is designed to mount upwards, a stick, eight or nine times the length of the rocket, is tied to it, sufficient to poise the rocket at an inch or two from its mouth.

ROCKETS, *Sky, Theory of the Flight of.* Mariotte takes the rise of rockets to be owing to the impulse or resistance of the air against the flame. Dr. Desaguliers accounts for it otherwise, as we shall state in the next article, with remarks upon the theory. We shall here add, that the stick is attached to keep it perpendicular; for if the rocket should begin to tumble, moving round a point in the choke, as being the common centre of gravity of rocket and stick, there would be so much friction against the air, by the stick between the centre and the point, and the point would beat against the air with so much velocity, that the re-action of

the medium would restore it to its perpendicularity. When the composition is burnt out, and the impulse upwards is ceased, the common centre of gravity is brought lower towards the middle of the stick; by which means the velocity of the point of the stick is decreased, and that of the point of the rocket is increased; so that the whole will tumble down, with the rocket end foremost.

All the while the rocket burns, the common centre of gravity is shifting and getting downwards, and still the faster and the lower as the stick is lighter; so that it sometimes begins to tumble before it be burnt out: but when, the stick being a little too heavy, the weight of the rocket bears a less proportion to that of the stick, the common centre of gravity will not get so low, but that the rocket will rise straight, though not so fast.

Mr. Robins, considering the great use that may be made of rockets, in determining the position of distant places, and in giving signals for naval and military purposes, procured some, with a view of ascertaining the height to which they rise, and the distance at which they may be seen. The greatest part of them did not rise to above 400 yards, one to about 500, and one to 600 yards nearly. The greatest distance at which these were observed, was from 35 to 38 miles. Others were fired at a different time; one of which rose to 690 yards; and it was observed, that the largest, which were about $2\frac{1}{2}$ inches in diameter, rose the highest. In some subsequent experiments, conducted by M. Da Costa, Mr. Banks, &c. it was found that of two rockets, of about $3\frac{1}{2}$ inches diameter, one rose to about 833, and the other to 915 yards. In another trial, a rocket of 4 inches diameter rose to 1190 yards. In other experiments, a rocket of $1\frac{1}{2}$ inch rose to 743 yards; one of 2 inches to 659; one of $2\frac{1}{2}$ inches to 880; another of the same size to 1071; one of 3 inches to 1254; one of $3\frac{1}{2}$ inches to 1109; and one of 4 inches rose to near 700 yards, and, turning, fell to the ground before it went out. Besides these, there was one of the rockets of 24 inches in diameter, which rose to 784 yards, and another of the same size to 833 yards. From these experiments it is inferred, that rockets from $2\frac{1}{2}$ to $3\frac{1}{2}$ inches in diameter are sufficient to answer all the purposes for which they are intended; and they may be made to rise to a height, and to afford a light capable of being seen to considerably greater distances than those just mentioned. The manufacture of large rockets is expensive; and they are more uncertain than those of a smaller size. Phil. Transf. vol. xlv. p. 578, &c. or Robins's Math. Tracts. vol. i. p. 317, &c.

To prevent mischief from the fall of the rocket-sticks, which are sometimes very heavy, they now bore the sticks of large rockets, and fill them with powder, that they may shiver in the air before they fall. See *FIRE-Works*.

ROCKETS, *Congreve's*, a new species of war rockets, being thus called from the name of their inventor, sir William Congreve. They differ from the common rocket, as well in their magnitude and construction, as in the powerful nature of their composition; which is such, that without the incumbrance of any ordnance, (the rocket containing the propelling power wholly within itself,) balls, shells, case-shot, and carcasses, may be projected to the distance of from 1000 to 3000 yards, which renders them a most efficacious species of artillery; as they may not only be employed in every case, and for every purpose, of the usual light and heavy ordnance, but they are available also in a variety of instances, in which the nature of the ground or other

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other impediments prevent the effectual introduction of that arm.

These rockets are of various dimensions, as well in length as in calibre, and are differently armed according as they are intended for the field, or for bombardment and conflagration; carrying, in the first instance, either shells or case-shot, which may be exploded at any part of their flight, spreading death and destruction amongst the columns of the enemy; and in the second, where they are intended for the destruction of buildings, shipping, stores, &c. they are armed with a peculiar species of composition, which never fails of destroying every combustible material with which it comes in contact.

The latter are called *carcass-rockets*, and were first used at Boulogne, their powers having been previously demonstrated in some experiments made at Woolwich by Sir William Congreve, in the presence of Mr. Pitt and several of the cabinet ministers, in the month of September 1805. Sir Sidney Smith was ordered to command the expedition intended for this purpose; but from the lateness of the season, it being near the end of November before the preparations were completed, nothing was done that year. In 1806 Sir William Congreve renewed his proposition for the attack of Boulogne by rockets, which was ordered to be put in execution after Lord Moira, at that time master-general of the ordnance, and Lord Howick, first lord of the admiralty, had satisfied themselves of the efficacious nature of the weapons, from other experiments made again at Woolwich for that purpose. The attack was accordingly made under the command of Commodore Owen, late in October 1806; having been put off during the summer months, in consequence of the negotiations for peace, at that time pending between the courts of England and France.

From this delay, however, instead of being conducted upon the grand scale at first intended, it became a mere desultory attack, in which not more than 200 rockets were fired. The town, however, was set on fire by the first discharge, and continued burning for near two days: it was supposed also that some shipping were destroyed, but the greater part of the rockets certainly went over the basin into the town.

After this, their first introduction as a military weapon, the *carcass-rockets* have been used in almost every expedition, and in nearly all under the immediate inspection of their inventor. Their reputation was completely established at Copenhagen, where they did incredible execution: after the siege, they were ordered by Lord Chatham, the master-general of the ordnance, to be reported upon by a committee of field officers of artillery, who had witnessed their effect in that bombardment, and who pronounced them to be "*a powerful auxiliary to the present system of artillery.*" Indeed the powers of this weapon are now established upon the best of all testimonies, the best of all criterions, the testimony of the enemy; a striking instance of which occurred at the siege of Flushing, where General Mounet, the French commandant, made a formal remonstrance to Lord Chatham respecting the use of them in that bombardment; and than which no better fact need be recorded of the effect they must have produced. If such, therefore, be the acknowledged power of the weapon in such an early stage of its progress, and only when a handful, as it were, were used, merely by way of experiment, under the inventor, with not more than twenty or thirty men to assist him, what may not be expected, when regularly organized in the service, and generally combined with the other implements of bombardment?

At present we have spoken only of the *carcass-rockets*; it is not, however, in bombardment only that this species of artillery may be advantageously employed; their powers in the field having been demonstrated to be equally irresistible. The crown prince of Sweden was the first general who bore testimony to their effects in this service; a small corps of rocketeers, under the command of Capt. Bogue of the royal artillery, having been attached to this division of the allied armies; and who, in the ever memorable battle of Leipzig, while yet the fate of empires was suspended in fearful equilibrium, gloriously maintained the honour of the British arms, and incontrovertibly established the reputation of the rocket-system.

They were afterwards employed with great effect when the British army, under the command of the duke of Wellington, crossed the Adour; and, had the war continued, we should, in all probability, have seen them as commonly in active service in the field as the other artillery. In consequence of these successes, and a variety of other instances, which our limits will not allow us to enumerate, his royal highness the prince regent commanded the formation of a rocket corps, which took place on the 1st of January 1814, by augmentation to the regiment of royal artillery, as proposed by Lord Mulgrave, master-general of the ordnance.

Having thus given a sketch of the history, improvement, and introduction of the rocket-system of artillery, we shall proceed to give such explanation of the nature and application of the weapon in different species of attack and defence, as may be consistent with the general interest of the service; such only being suffered to transpire; for, the military rocket being exclusively an English weapon, all the more minute and important particulars, both of construction and composition, are very properly kept a profound secret, being probably known in complete detail by no person except the inventor himself.

The general form of all the different kinds of rockets, for whatever service they may be designed, is cylindrical, being formed in strong metallic cases, and armed, as we have before stated, either with *carcass* composition for bombardment and conflagration, or with shells and case-shot for field-service. They are, however, of various weights and dimensions, from the eight-inch *carcass*, or explosion rocket, weighing nearly three hundred weight, to the six-pound shell-rocket, which is the smallest size used in the field. The sticks which are employed for regulating their flight are also of different lengths, according to the size and service of the rocket; and which, for the convenience of carriage, are stowed apart from the rocket, and so contrived as to consist of two or more parts, which are connected to it, and to each other, when requisite, with the utmost expedition.

Rocket ammunition is divided into three classes, *heavy*, *medium*, and *light*; the former including all those of above 42lbs., which are denominated according to their calibre, as eight-inch, seven-inch, six-inch, &c. rockets; the medium include all those from the 42lb. to the 24lb. rocket; and the light, from the 18-pounder to the 6-pounder inclusive.

The *carcass-rockets* are armed with strong iron conical heads, containing a composition as hard and solid as iron itself, and which, when once inflamed, bids defiance to any human effort to extinguish it; and consequently involves, in an inextinguishable flame, every combustible material with which it comes in contact. The 42-pounder and 32-pounder *carcass-rockets*, are those which have hitherto been chiefly employed in bombardments: the penetration of the 32lb. *carcass-rocket* in common ground is nine feet; and

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in some instances where they have been employed, they have been known to pierce through several floors, and through the sides of houses: this is the smallest rocket used in bombardment, and the largest employed in the field; the most usual size for the latter service being the 24, 18, 12, and 6-pounders.

The ranges of the eight-inch, seven-inch, and six-inch rockets, are from 2000 to 2500 yards; and the quantity of combustible matter, or bursting powder, from 25 lbs. to 50 lbs.; and from their weight combined with less diameter, they possess a greater power of penetration than the heaviest shells, and are therefore equally efficient for the destruction of bomb-proofs, or the demolition of strong buildings; so that the facility of application, on which the inventor has hitherto rested the merit of the rocket-system, is not its only excellence; for it thus appears, that it actually will propel heavier masses than can be done by any other means, that is to say, masses, to project which, it would scarcely be possible to cast, much less to transport, mortars of sufficient magnitude. The largest rocket that has yet been constructed, has not, we believe, exceeded three hundred weight; but Sir William Congreve seems to have in contemplation others of much superior magnitude, weighing from half a ton to a ton weight, which being driven in very strong cast-iron cases, may possess such force, that, when fired along trenches cut to the foot of the glacis, from the nearest point of the third parallel, against the revetement of any fortrefs, even unimpaired by a cannonade, it shall, by its mass and form, pierce the same; and, having pierced it, shall with one

explosion of several barrels of powder, with which it is loaded, blow such portion of the masonry into the ditch, as may, with very few rounds, complete a practicable breach.

The 42 and 32-pounders are those, as we have before stated, which have hitherto been principally used in bombardment, and which, for the general purposes of that service, are found quite sufficient, as they will convey from 7 lbs. to 10 lbs. of combustible matter each, and have a range of upwards of 3000 yards.

The 32-pounder rocket may be considered as the medium rocket, being the smallest used in bombardment as a carcass or explosion rocket, and the largest used with shot or shell in the field; but as the 24-pounder is very nearly equal to it in all its applications in the latter service, being quite equal to the propelling of the Cohorn shell, or 12-pounder shot, it is, from the saving in weight, generally preferred to the 32-pounder.

The 18-pounder, which is the first of the light nature of rockets, is armed with a 9 lb. shot or shell; the 12-pounder with a 6 lb. ditto; the 9-pounder with a grenade; and the 6-pounder with a 3 lb. shot or shell. From the 24-pounder to the 9-pounder rocket inclusive, a description of case-shot rocket is formed of each nature, armed with a quantity of musket or carbine balls, put into the top of the cylinder of the rocket.

The following table presents a general view of the ranges, elevations, and other particulars of several of the most usual descriptions of Congreve rockets.

Nature of Ammunition.	Armed with	Extreme Range.	Elevation for extreme Range.
42-Pounder carcass- rockets	Carcasses { large, 18lbs. of combustible matter } { small, 12lbs. ditto	- 3500	Elevation for extreme range not less than 60°
42-Pounder shell- rockets			
32-Pounder carcass- rockets	Carcasses { large, 18lbs. of combustible matter } { medium, 12lbs. = 13-inch carcass } { small, 8lbs. = 10-inch ditto	- 2000	60°
32-Pounder shell- rockets		- 2500	60° to 55°
32-Pounder case-shot rockets		Shells, 9-pounder spherical	- 3000
32-Pounder case-shot rockets	Case-shot { large, containing 200 carbine balls } { small, 100 ditto	- 2500	50°
32-Pounder explo- sion rockets		{ Strong iron cones, containing from 5lbs. to } { 12lbs. of powder, to burst by fuzes - }	from 2500 } to 3000 }
12-Pounder case-shot rockets	Case-shot { large, 72 carbine balls } { small, 48 ditto	- 2000	45°
			- 2500

Note. The mean velocity of any rocket is to that of its equivalent shell in about the ratio of 8 to 9, the ranges being the same.

From the preceding table it will be seen, that the 32-pounder carcass-rocket will range 3000 yards, with the same quantity of combustible matter as that contained in the 10-inch spherical carcass; and 2500 yards, with the same quantity as that of the 13-inch spherical carcass. It will be seen also, that the 12-pounder case-shot rocket, which is so portable that it may be used with the facility of musquetry, has a range nearly double that of field artillery, carrying as many bullets as the 6-pounder spherical case: add to which, that from the nature of the construction of the rocket, these bullets are projected from it in any part of its track, with an increase of velocity, whereby its operation becomes frequently most destructive at that point where any different species of ammunition ceases to be effective.

Of this description of case-shot rocket, 100 infantry soldiers will carry into action, in any situation where musquetry can act, 300 rounds, and 10 frames for discharging them; from each of which, four rounds may be fired in a minute. And of the same description of case-shot for the use of cavalry, four horses will carry 72 rounds, and four frames; from which may be fired 16 rounds in a minute; each horse not having more than the ordinary burden of a dragoon's horse.

The rockets used by the cavalry are, however, now designed to be the 12-pounders, armed with a 6-pounder shell or case-shot; each horse carrying four of these rockets.

Every third man, besides his portion of ammunition, has, in addition, to carry the chamber from which the rockets are discharged. This chamber, however, weighs
but

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but six pounds, and is, therefore, but little additional burden; so that the rockets may be discharged parallel to the surface, and as near to it as possible.

The weight of ammunition carried by the troop horse, with the full complement going into action, is such, that the horse is fully equal to any ordinary operations. But in long marches, small tumbrils are provided for carrying a part of the ammunition; which leaves the horse, in travelling, one stone four pounds of ammunition to carry, a burden of two stone less in line of march than that of the heavy dragoon's or artillery-man's horse: to which we may further add, that as the rocketeer has no heavy duty to perform, no guns to sponge, nor any to limber up or unlimber, he may, upon an average, be a lighter man by three stone than is required for an artillery-man, who has constantly the above duties to perform; a difference amounting, within a few pounds, to the whole weight of the ammunition carried by the men even in action.

A subdivision of rocket cavalry consists of 24 horses and 20 men, four of the horses being employed in carrying the ammunition for the subdivision. Each of these ammunition horses carries 18 rockets and rocket-sticks, and a proportion of small stores, weighing in all, including saddle, saddle-bags, &c. 19 stone; so that these 20 men will carry into action 152 rounds of 12-pound shell or case-shot, and six chambers, or *bouches à feu*; from which, without any extraordinary exertion, 80 rounds of 6-pound ammunition may be discharged in three minutes.

It is obvious that the combined celerity and quantity of the discharge of ammunition of this description of artillery cannot be equalled, or even approached, taking in view the means and nature of the ammunition employed, by any other system. The universality, also, of the operation, not being encumbered with wheel-carriages, must be duly appreciated; as, in fact, it can proceed not only wherever cavalry can act, but even wherever infantry can get into action, as has been already stated.

The heavier species of rockets, as the 32-pounder or 24-pounder, as also the 18 and 12-pounders, are sometimes carried in cars of a peculiar description, which not only convey the ammunition, but are contrived also to discharge each two rockets in a volley, from a double iron-plate trough, which is of the same length as the boxes for the sticks, and travels between them; but which, being moveable, may, when the car is unlimbered, be shifted into its fighting position at any angle from the ground ranges, or point blank, up to 45°, without being detached from the carriage. The limbers are always supposed to be in the rear. The rockets are fired with a port-fire and long stick: two men will light the light car, and four men the heavy one.

At present we have confined our remarks to rocket cavalry: it is obvious, however, that they may, with equal facility, be accommodated to the use of infantry. In this case, one man in ten, or any greater proportion, carries a frame of very simple construction, standing on three legs, like a theodolite, when spread; and which closes similarly, for the convenience of carrying. It is mounted at top with an open cradle, from which the rockets are discharged, either for ground ranges, or at any required elevation. The rest of the men carry each three rounds of ammunition, which for this service is proposed to be either 12-pounder shell-rockets, or the 12-pounder rocket case-shot; each round equal to the 6-pound case, and ranging 2500 yards; so that 100 men will bring into action, in any situation where musquetry can be used, nearly 300 rounds

of this description of artillery, which ranges at 45°, nearly double those of light field ordnance.

When the rockets are employed in bombardments, they are discharged from frames of a different construction; the rockets employed in this service being larger than those used for the field: they are, however, equally simple, and the discharges may be made with great rapidity. In many cases, however, the frames are dispensed with, and the rockets are thrown from a battery erected for that purpose. The great advantage of this system is, that as it dispenses with apparatus, where there is time for forming a work of this sort, of considerable length, the quantity of fire that may be thrown in a given time is limited only by the length of the work; one of 200 feet in length being sufficient for firing 100 rockets in a volley, and so on for any greater length; or an incessant and heavy fire may, by such a battery, be kept up from one flank to the other, by replacing the rockets as fast as they are fired in succession.

Another use is for the defence of a pass, or for covering the retreat of an army, by placing any number, hundreds or thousands, of 32 or 24-pounder shell-rockets, or 32-pounders armed with 18-pounder shot, limited as to quantity only by the importance of the object which is to be obtained; as, by this means, the most extensive destruction, even amounting to annihilation, may be carried amongst the ranks of an advancing enemy, and that with the exposure of scarcely an individual. For this purpose, the rockets are laid in batteries of 100 or 500 in a row, according to the extent of ground to be protected; so that one man is in fact alone sufficient to fire the whole in succession, beginning with that nearest to the enemy, as soon as he shall perceive him near enough to warrant his firing. Where the batteries are very extensive, each battery may be subdivided into smaller ones; so that the whole, or any part, or particular division, may be fired, according to the number and position of the enemy advancing.

A similar application of the rocket artillery is as follows: a low work is thrown up for the defence of a post, or of a chain of posts, consisting merely of as much earth and turf as is sufficient for forming the sides of shallow embrasures, for large rockets, placed from two to three feet apart, or nearer; from which the rockets are supposed to be discharged independently, by a certain number of artillerymen, employed to keep up the fire according to the necessity of the case. In this manner, such an incessant fire may be maintained as would be next to impossible for an advancing enemy to pass through, not only from the quantity, weight, and destructive nature of the ammunition, but from the closeness of its lines, and its contiguity to the ground. The larger kind of these rockets are also equally applicable to the attack and defence of fortified places. They may also be employed by infantry against an attack from cavalry: they may be even carried by a storming party into the place, by which the parapet may be scoured of the enemy, any street or passage enfiladed; or thrown occasionally into the town, as well to distract the attention of the garrison, as to serve as an index to each of the storming divisions, as to the situation and progress of each party. In fact, there is no limit to their application, being as general and extensive as that of gunpowder itself.

In naval warfare the rocket-system likewise possesses peculiar advantages; for in consequence of there being no re-action in these projectiles on the point of discharge, rockets, carrying the quantity of combustible matter, as, by the ordinary system, would require to be thrown from the largest mortars, and from ships of very heavy tonnage, may

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be used in the smallest boats of the navy; and the 12-pounder, and 18-pounder, have been frequently fired from four-oared gigs; and it should also be remarked, that rockets of the above weight will ricochet in the water remarkably well at low angles; they may also be employed to facilitate the capture of a ship by boarding, by being thrown, by hand, into the ports, &c. by the boarding party, as soon as they get along-side, as the confusion and destruction which will thence inevitably ensue, cannot but facilitate the performance of this dangerous duty. These rockets are also peculiarly adapted to add to the dreadful effects of fire-ships; for, according to the present system, it is not improbable that a number of fire-ships may pass harmlessly through an enemy's fleet, by the exertion of their crews in towing them clear, whereas, if they were supplied each by a sufficient number of rockets, such an extensive and devastating fire would be spread in every direction, as to involve every vessel of the enemy in that destructive element. After the above statement, little need be said in reference to the general utility and importance of the rocket-system. It will be sufficient to observe, that it consists, first, in their being a species of projectiles of the most destructive kind, which, containing in themselves the propelling power, dispenses with the use of heavy ordnance, and consequently offers great facilities to the movement of an army. 2dly. The extensive nature of the fire that may be kept up, by a few men, against any important point. 3dly. It may be employed in a variety of cases in which the usual artillery, from the nature of the ground, or other impediments, cannot be rendered effective; and lastly, in naval bombardments, in consequence of its trifling re-action, it may be thrown from cutters and small boats, and therefore from points which could never be approached by the vessels usually employed in that service.

It may also not be amiss to observe, that in point of expence the rocket likewise possesses the advantage. The 32-pounder carcass-rocket costs only 1*l.* 1*s.* 11*d.* complete, in every respect, for service; whereas its equivalent, the 10-inch spherical carcass, with the charge of powder necessary to convey it 3000 yards, which power is contained in the rocket, costs 1*l.* 2*s.* 7*d.*, independent of any charge for the mortar, mortar-bed, platform, difference of transport, &c. &c. attaching to the spherical carcass, and not to the rocket, which actually requires no apparatus whatever to use it in a bombardment, and has, therefore, no charge attaching to it, beyond the first cost, but that of transport; and a vessel of 300 tons will carry 5000 of them at least. It is also further to be observed, that the above 1*l.* 1*s.* 11*d.* supposes the whole construction to be effected by manual labour: by introducing machinery, which we understand is about to be done, the expence of the 32-pounder carcass-rocket will be reduced to 18*s.*, or even to 16*s.*, by using bamboo instead of the usual stick, which is but about three-fourths of the expence of the 10-inch spherical carcass, independent of all the other charges of transport, &c. attending the latter.

But the comparison, as to expence, is still more in favour of the rocket, when compared with the larger nature of carcasses. The 13-inch spherical carcass costs 1*l.* 17*s.* 11½*d.*, to throw it 2500 yards, while its equivalent rocket costs but 1*l.* 5*s.* 0*d.*, being a saving, on the first cost, of 12*s.* 11½*d.*, and a similar proportion of saving runs through the whole system.

ROCKET *Light Ball*, also invented by sir William Congreve, is a species of light ball thrown into the air by means of one of his rockets; where, having reached the summit

of the rocket's ascent, it is detached from it by an explosion, and remains suspended in the air by a small parachute, to which it is connected by a chain. Thus, in lieu of the transient momentary gleam obtained by the common light ball, a permanent and brilliant light is obtained, and suspended in the air for five minutes at least, so as to afford time and light sufficient to observe the motions of an enemy either on shore or at sea; where it is particularly useful in chasing, or for giving distant and more extensive night signals. It is to be observed, that nothing of this kind can be obtained by the projectile force of either guns or mortars, because the explosion infallibly destroys any construction that could be made to produce the suspension in the air.

Floating Rocket Carcass.—This is another of the inventor's applications of his rocket, and of the parachute; for the purpose of conveying combustible matter to distances far beyond the range of any known projectile force; at the same time that it is cheap, simple, and portable. The floating carcass, like the light ball, is thrown into the air attached to a rocket, from which being liberated at its greatest altitude, and suspended to a small parachute, it is driven forward by the wind, and will, in a moderate breeze, afford ranges at least double those of the common carcass; and may, therefore, for naval purposes, from a blockading squadron, be thrown in great quantities, by a fair wind, against any fleet or arsenal, without the smallest risk, or without approaching within range either of guns or mortars. Thus, in the blockade, a few years back, of the Russian fleet at Baltic fort, it might have been continually used, at all events, with great prospect of success, and certainly where no other means of annoyance could be applied. The rocket containing this carcass is not larger than the 32-pounder carcass-rocket; and the whole expence, added to the rocket, does not exceed five shillings; nor are the approaches of the carcass itself necessarily visible by night, as it may be so arranged, as not to inflame till some time after it has settled. It is evidently, therefore, capable of becoming a very harassing weapon, with a great chance of doing as much mischief as any other carcass amongst large fleets and flotillas, by lodging unperceived in the rigging, or lighting on extensive arsenals, in situations where no other means of annoyance whatever exists.

ROCKETS, *Theory of the Motion of*. The theory of the flight of rockets differs very essentially from that of the usual projectiles. In the latter, the body is launched into space with a certain and determinate velocity; and by rejecting the resistance of the air, a most beautiful theory is established, possessing great simplicity and generality, and which is, therefore, highly interesting to the speculative mathematician, notwithstanding it is of little or no use to the practical artillery. In order to render the theory useful in the latter sense, a great variety of experiments have been made to ascertain the effect of the air's resistance, which is not at all considered in the former case, the initial velocity of the ball, the strength of fired gunpowder, &c. &c.; yet after all, it must be acknowledged that very little has been gained, and the practitioner is still much more guided by his own experience, than by any light that has been thrown upon the subject from long and intricate mathematical theories.

The motion of rockets is more complicated than that of common projectiles, partaking, in fact, of all the anomalies that attend the accelerated motion arising from the rocket composition, and the uniform motion of the rocket-case, after the composition is expended; and as little or no advantage

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tage has yet been gained from the experiments that have been made with cannon, even where the angle of elevation and the initial velocity of the ball were both accurately known, it seems totally useless to look for any assistance from mathematical investigations, with respect to determining the ranges, &c. of military rockets: because if we could determine with the greatest accuracy the point, position, and velocity of the rocket, at the moment when the composition was expended, the remaining part of its track would still be subject to all the inequalities attending on common projectiles.

If we confine our investigations only to that motion which has place during the time the composition is burning, it is not improbable that much light might be thrown on the subject from a well arranged course of experiments; and that their motion might be reduced to precise rules, in several applications of the rocket-system, particularly in the cases we have mentioned, where they are intended to be used as a kind of battering-train.

The great impediment in gunnery to the exact determination of the momentum of any given ball, when projected with a given velocity, and from a given distance, is the resistance of the air; because it can only be found from experiment at certain distances, and it is difficult from a few partial cases to infer a general law. That the resistance of the air to the same ball is as some function of the velocity, there can be no doubt; but we much question whether that determined by Dr. Hutton, *viz.* $r = .00002576 v^2 - .00388 v$, although the most accurate of any yet found, is as correct as could be wished. Indeed, when we consider the infinitude of different forms under which the function of a single variable may appear, it seems much too confined a scale to attempt to reduce it to the simple form $av^2 + bv$; *viz.* to limit the dimension of the function, and attempt every accommodation by means of the co-efficients a and b . With regard to the rocket, the case is very different: the very medium, which in the former instance is the great impediment to an accurate theory, is here the principal agent in producing the motion; and moreover, we are here, from the nature of the weapon, enabled to ascertain all the successive energies of the propelling power, and the resisting force, which, in the other case, are only determinable at two or three different distances: on which account, it is to be presumed that more advantage may be here expected to be gained from experiment, than in the cases above referred to.

Instead of a ball impinging on the ballistic pendulum, at the distance of 60 or 100 yards, as practised in gunnery experiments, a rocket might be fixed to the same pendulum, and its whole energy observed with the greatest accuracy; or, in case such experiment should be thought inconclusive, for want of that partial vacuum which has place behind the rocket when in flight, it might be attached to some wheel, or revolving body, and its successive energies measured by the motion of some weight attached to the revolving axis of the machine. This is a most important advantage attending experiments on the momentum of rockets, which it is impossible to accommodate to other projectiles.

We are not aware, however, that any such experiments have yet been undertaken; and, therefore, all our investigations on the flight, momentum, &c. of rockets must necessarily be hypothetical. In fact, we have two distinct theories of the motion of rockets, the one by Mariotte, and the other by Defaguliers; the latter attributing their motion to the momentum of combustion, and the other to the elastic nature of the gas generated by the combustion and the resistance of the air. Defaguliers illustrates his hypo-

thesis as follows: "Conceive the rocket to have no vent at the choke, and to be set on fire; the consequence will be, either that the rocket will burst in the weakest place, or if all its parts be equally strong, and able to sustain the impulse of the flame, the rocket would burn out immovably. Now as the force of the flame is equable, suppose its action downwards, or that upwards sufficient to lift 40 pounds; as these forces are equal, but their directions contrary, they will destroy each other's action. Imagine then the rocket opened at the choke; by this means, the action of the flame downwards is taken away, and there remains a force equal to 40 pounds acting upwards, to carry up the rocket and stick." Although there is some ingenuity and plausibility in the above reasoning, we are by no means inclined to admit its accuracy. The action of the flame or gas within the rocket, when closed, as supposed above, we conceive to arise wholly from the elastic nature of the gas, and the re-action it experiences against the ends and sides of the rocket-case; the whole of which ceases, as soon as a free vent is given to the flame; and, therefore, if a rocket could be fired in a vacuum, as the flame would, in that case, experience no resistance, there would be no re-action, and consequently no motion would ensue. In order to submit the above supposition to experiment, take a strong piece of whale-bone, and bend it into the form of a bow, by means of a bit of thread or silk fastened to each extremity: then if this bow be suspended by its middle, and two pieces of board, or two books, be set up on their edges, each touching one end of the bow, and the string by which it is bent be cut, both books will, from the elastic nature of the whale-bone, be thrown down with considerable force. Now repeat the experiment, but set up only one book, leaving the other end of the bow entirely free; then cut the string as before, and it will be found that, for want of the re-action of the other book, no effect, or very little, is produced on the standing book: it may be a little disturbed, but it will not fall. This we consider to be a very similar case to the action of the gas on the rocket, when shut up and opened, as supposed by Defaguliers; and if so, it shews very distinctly the inaccuracy of his hypothesis.

As a mere matter of mathematical investigation, it certainly reduces the theory to the most simple form; because here it is not essential, so far as regards the propelling power, what may be the velocity of the rocket; which power is, therefore, supposed uniform during the whole time of combustion: whereas, in Mariotte's theory, which attributes the motion of the rocket to the resistance or re-action of the air, the propelling force will decrease as the velocity increases, in consequence of the partial vacuum left behind the rocket in its flight; so that the velocity becomes, as it were, both a *datum* and *quæsitum*; and the correct solution of the problem necessarily involves the integration of partial differences of the highest orders.

We must confess that we feel no inclination to meet the problem under this formidable shape, unless we had a good set of experiments on which to rest our first premises, and from which, therefore, some useful conclusions might be expected to be deduced. We shall, therefore, in what follows, avail ourselves of a few problems relative to the motion and flight of rockets in non-resisting mediums, as given by Mr. Moore of the Royal Military Academy, in his Treatise on the Motion and Flight of Rockets; who, we presume for want of experiments, has adopted the hypothesis of Defaguliers, by supposing the motion of the rocket to arise from the momentum of the ignited composition. We shall also suppose the rocket and stick perfectly free the moment after being fired; for, without this, it is obvious that the angle

ROCKET.

of elevation of the rocket's direction, and that of its actual discharge, will be essentially different. The first motion of the rocket, like all other motions not produced by a great momentary impulse, is slow; and before the stick is clear of the frame, gravity has been acting upon the rocket, and depressed it below its natural position, while the stick is prevented from being equally depressed, by the top of the frame; so that the angle of projection is in fact considerably less than the angle of the frame, or slope of the rocket's first position. In consequence of this, the rocket has the appearance of falling the moment after projection; and, for this reason also, the angle for producing the greatest range of a rocket exceeds very considerably that which gives the extreme range of a shell projected from a mortar.

PROP. I.

The strength or first force of the gas from the inflamed composition of a rocket being given, as also the weight and quantity of the composition, the time of its burning, and the weight and dimensions of the case and stick; to find the height to which it will ascend, when projected perpendicularly upwards.

It is obvious here, that the principal point of investigation is the height to which the rocket will rise, and the velocity it will have acquired, at the moment when the composition is all expended; as the determination of its farther ascent, with these data, depends upon well-known and established principles. We shall, therefore, only consider the former case. For this purpose, put

- w = the weight of the rocket-case and stick.
- c = the weight of the composition.
- a = the time in which it will be consumed.
- n = the medium pressure of the atmosphere.
- s = the assumed force of the inflamed composition.
- d = the diameter of the rocket's base, and $p d^2$ its area.
- x = the space described. And
- v = velocity acquired in any indeterminate time t .

Then $s n p d^2$ is the constant impelling force of the composition.

Now the weight of the quantity of rocket-matter that is consumed in the time t is $\frac{c t}{a}$; therefore, $c - \frac{c t}{a}$ is the weight of the part unconsumed; and $w + c - \frac{c t}{a}$, or $m - \frac{c t}{a}$ (making $m = w + c$), is the weight of the whole mass, at the end of the time t .

Hence $s n p d^2 - \left(m - \frac{c t}{a}\right)$ is the *motive* force, and

$$\frac{s n p d^2 - \left(m - \frac{c t}{a}\right)}{m - \frac{c t}{a}} = \frac{a s n p d^2}{a m - c t} - 1, \text{ the accelerating force.}$$

Therefore, from the known formulæ for variable forces, we have $\dot{v} = 2 g f t$, which hence becomes

$$v = \frac{2 a g s n p d^2 t}{a m - c t} - 2 g t;$$

the fluent of which is

$$v = - \frac{2 a g s n p d^2}{c} \times \text{hyp. log.} \left(\frac{a m}{c} - t \right) - 2 g t, \text{ or}$$

$$v = - b \cdot \text{hyp. log.} \left(\frac{a m - c t}{c} \right) - 2 g t;$$

$$\text{where } b = \frac{2 a g s n p d^2}{c}.$$

This fluent, corrected for the case in which $t = 0$, gives the correct fluent,

$$v = b \cdot \text{hyp. log.} \frac{a m}{a m - c t} - 2 g t;$$

which, when $t = a$, becomes

$$v = b \cdot \text{hyp. log.} \frac{m}{m - c} - 2 g a,$$

the velocity required.

Again, to find the space described in the same time, we have $\dot{x} = v t$, or $\dot{x} = b t \times \text{hyp. log.} \frac{a m}{a m - c t} - 2 g t t$.

The correct fluent of this is $x = \left(b t - \frac{b a m}{c} \right) \text{hyp. log.}$

$$a m + \frac{b}{c} (a m - c t) \cdot \text{hyp. log.} (a m - c t) + b t - g t^2;$$

and in the case when $t = a$, it becomes $x = \frac{a b}{c} +$

$$\left((m - c) \text{hyp. log.} \frac{m - c}{m} + c - \frac{a c g}{b} \right) \text{the space sought.}$$

It will be observed, however, that in both these cases, gravity has been supposed to act directly in opposition to the motion of the rocket; but had we considered the flight uninterrupted by gravity, (as we must suppose, in estimating its flight, when projected at any given angle, where gravity is not considered as in any respect retarding the rocket's motion in the first line of projection,) then the last terms in each of the above expressions will disappear, and we shall have simply

$$v = b \cdot \text{hyp. log.} \frac{m}{m - c}, \text{ and}$$

$$x = \frac{a b}{c} + \left((m - c) \text{hyp. log.} \frac{m - c}{m} + c \right).$$

Having thus determined the height of the rocket, and its velocity, when the composition is just consumed, it follows that its whole height may be determined in the usual manner, by the known formula for the ascent and descent of heavy bodies.

PROP. II.

To determine the path of a rocket near the earth's surface, neglecting the resistance of the air.

If, during the time the rocket was on fire, the weight of the whole mass remained constant, the path of the rocket would, from the known laws of the composition and resolution of forces, be a right line; but this not being the case, on account of the continual wasting of the composition, the accelerative force will be different at every instant; and, therefore, since the accelerative force of gravity is constant, the path of the rocket will necessarily be a curvilinear one.

Let A C (*Plate Pyrotechny, fig. 16.*) be the first direction of the rocket, and A D the curve in which it moves; draw C D B perpendicular to the horizontal line A B. Now the path of the rocket will be determined by finding the relation between A B and B D, or between A C and C D, the angle B A C being given.

Now

Now we have found, generally for AC, $x = (bt - \frac{abm}{c})$ h. l. $am + \frac{b}{c}(am - ct)$ h. l. $(am - ct) + bt$,

while CD = gt^2 . Hence, by assuming any number for t , the relation between AC and CD will be determined, or the relation between AB and DB; for representing AC by $\phi(t)$, we have AB = $\text{cof. } A \cdot \phi(t)$, and CB = $\tan. A \cdot \text{cof. } A \cdot \phi(t)$, and DB = $\tan. A \cdot \text{cof. } A \cdot \phi(t) - gt^2$.

PROP. III.

To find the velocity of the rocket in the curve at any given instant.

Let AC (*Plate Pyrotechny, fig. 17.*) = x , and AD = z , being the space described by the rocket in the time t ; then calling the velocity at C = b . h. l. $\frac{am}{am - ct} = V$; the velocity at D in the curve will be expressed generally by $\frac{\dot{z}V}{\dot{x}}$, following from the laws for the resolution and composition of motion. Now, by the laws of falling bodies, CD = gt^2 ; and putting k and l for the natural sine and cosine (to rad. 1) of the angle CAB of projection, we shall have AB = lx , CB = kx , and DB (the ordinate of the curve) = $kx - gt^2$. Therefore

$$\dot{z} = [(k\dot{x} - 2gt)^2 + l^2\dot{x}^2] \text{ and}$$

$$v = \frac{\dot{z}V}{\dot{x}} = \frac{[l^2\dot{x}^2 + (k\dot{x} - 2gt)^2]^{\frac{1}{2}}}{\dot{x}} \times V.$$

Again, by the theory of variable motions, $\dot{x} = vt$; consequently

$$v = \frac{[l^2v^2t^2 + (kvt - 2gt)^2]^{\frac{1}{2}}}{vt} \times V, \text{ or}$$

$$v = [v^2l^2 + (kV - 2gt)^2]^{\frac{1}{2}}, \text{ or}$$

$$v = [l^2b^2 \cdot \text{h. l.}^2 \frac{am}{am - ct} + (kb \cdot \text{h. l.} \frac{am}{am - ct} - 2gt)^2]^{\frac{1}{2}},$$

the velocity of the rocket at D; which requires no correction.

When the angle of projection is 90° , $l = 0$, and $k = 1$; therefore v , in this case, will be = $b \cdot \text{hyp. log.} \frac{am}{am - ct} -$

$2gt$, as determined in the preceding part of this article; and when $g = 0$, or when the action of gravity is not considered, the velocity of the rocket in its rectilinear path is

$$v = b \cdot \text{hyp. log.} \frac{am}{am - ct}, \text{ which agrees with what has}$$

been already observed.

When the angle of elevation is 30° , $k = \frac{1}{2}$, and $l = \frac{\sqrt{3}}{2}$, therefore

$$v = \left(\frac{3}{4}b^2 \cdot \text{h. l.}^2 \frac{am}{am - ct} + \left(\frac{1}{2}b \cdot \text{h. l.} \frac{am}{am - ct} - 2gt \right)^2 \right)^{\frac{1}{2}}.$$

And when the angle of elevation is 60° , then changing the values of k and l , we have

$$v = \left(\frac{1}{4}b^2 \cdot \text{h. l.}^2 \frac{am}{am - ct} + \left(\frac{\sqrt{3}}{2}b \cdot \text{h. l.} \frac{am}{am - ct} - 2gt \right)^2 \right)^{\frac{1}{2}}.$$

PROP. IV.

To find the horizontal range of a rocket, the angle of elevation, and the time the composition is on fire, being given.

Let D (*Plate Pyrotechny, fig. 18.*) be the place of the rocket, when all the matter it contained is just exhausted; and Cm and Cn the measures of the velocities of the rocket in the directions AC, DI, the latter of which is a tangent to the curve at D; then by trigonometry, $\sin. \angle Cnm (=$

$$nCB = IDB) = \frac{Cm}{Cn} \cdot \sin. \angle Cmn = \frac{Cm}{Cn} \text{ cof. of the}$$

$$\text{angle of elevation} = \frac{\text{velocity at C}}{\text{velocity at D}} \text{ cof. CAB.}$$

Whence, calling the velocities at C and D, V and v , computed on the principles of our second proposition, we have

$$\sin. IDB = \frac{V}{v} \text{ cof. CAB: and since we have found the}$$

angle IDB, it will be easy to determine that part of the range denoted by BL. For the curve from D being a

$$\text{parabola, } DH = \frac{su^2}{g}, \text{ and } VE = \frac{s^2v^2}{4g}, \text{ (from the laws}$$

of projectiles in vacuo,) where s and u represent the sine and cosine of the angle IDH; and consequently VF =

$$VE + EF = VE + DB = \frac{s^2v^2}{4g} + kx - gt^2,$$

whereof x is given by the first proposition.

Again, by the nature of the parabola VE : VF :: EH² :

$$FL^2 = \frac{u^2v^2}{g} \left(\frac{s^2v^2}{4g} + kx - gt^2 \right), \text{ and therefore}$$

$$FL = \frac{uv}{\sqrt{g}} \left(\frac{s^2v^2}{4g} + kx - gt^2 \right)^{\frac{1}{2}}, \text{ whence}$$

$$AL = \frac{uv}{\sqrt{g}} \left(\frac{s^2v^2}{4g} + kx - gt^2 \right)^{\frac{1}{2}} + \frac{su^2}{2g} + lx,$$

the entire range of the rocket, as required.

For a great variety of other propositions relative to this subject, see Moore's Treatise on the "Motion and Flight of Military Rockets."

ROCKET, in Botany. See ERUCA.

ROCKET, *Bastard*. See RESEDA.

ROCKET, *Corn, Sea, or Square-podded Rocket*, a distinct genus of plants, called by Tournefort *erucago*, and by Linnaeus *Bunias*; which see.

ROCKET, *Garden*, a name by which the *hesperis* of botanists is sometimes called. See HESPERIS.

ROCKET, *Water, Marsh, or Winter*, the name of a species of *Sifymbrium*; which see.

ROCKET is also used for a habit. See ROCHET.

ROCKFORD, in Geography, a post-town of America, in North Carolina; 573 miles from Philadelphia.

ROCKHILL, a township of America, in Bucks county, Pennsylvania, containing 1508 inhabitants.

ROCKINGHAM, a market-town and parish in the hundred of Corby, and county of Northampton, England, is situated close to the river Welland, at the distance of 26 miles N.N.E. from Northampton, and 84 miles N.N.W. from London. In former times it was a place of some note on account of its cattle and appendant forest. This castle was built by William the Conqueror, on the summit of a hill overlooking the town, and appears to have been

occasionally the residence of several of our early monarchs. In the reign of William Rufus, a great council of the nobility, bishops, and clergy, was assembled here to terminate the dispute between the king and Anselm, archbishop of Canterbury, respecting the right of investiture, and obedience to the see of Rome. The council sat on Sunday the 11th of March, 1094, in the chapel belonging to the castle. Edward III. frequently honoured this fortress with his presence; as is evident from the numerous dispatches, and other instruments of royal authority, which are dated at Rockingham, in different years of his reign. Edward IV. settled the manor here, together with the castle and forest, on his queen, Elizabeth, for her life-time. These afterwards formed part of the duchy of Cornwall, and continued so till the reign of Edward VI., when they were granted to Edward, lord Clinton, from whose family they passed to the Watsons, one of whom, sir Lewis Watson, was created baron Rockingham, of Rockingham castle, in the year 1644. At what period the castle was dismantled is uncertain; but it is probable that event happened early in the reign of Henry III., as in the 34th year of that monarch, it is described as being in a ruinous condition. Leland, who visited it in the time of Henry VIII., gives the following account of this structure in the first volume of his Itinerary. "The castelle of Rokingham standith on the toppe of an hill, right stately, and hath a mighte dicke, and bulwarkes agayne withoute the dicke. The utter waulles of it yet stand. The kepe is exceeding fair and strong; and in the waulles be certain strong towers. The lodgings that were within the area of the castelle be discovered and fall to ruine. One thing in the waulles of this castle is much to be notid; that is, that they be embatelid on booth the sides. So that if the area of the castelle were won by cumming in at either of the 2 greate gates of the castelle, yet the keepers of the waulles might defende the castelle. I marked that there is a stronge tower in the area of the castelle, and from it over the dungeon dike is a drawbride to the dungeon toure." All that now remains of the original building is the arched gateway of the grand entrance, which is flanked by two massy bastion towers. Rockingham forest extended about 20 miles in length, from Oxendon bridge to Stamford bridge, and four or five miles in breadth. Leland says there were only "fallow dere in it" "with dyers lodges for keepers" in his time.

The town of Rockingham consists chiefly of one irregular street. The market-day is Thursday, weekly; and there is an annual fair on the 25th of September. These privileges were granted by Henry III., at the request of Edmund, earl of Cornwall, the then possessor of the manor; but they are at present only nominal. According to the population returns of 1811, this parish contains 49 houses, and 230 inhabitants. The church is not remarkable, except for some handsome monuments, erected to commemorate different individuals of the Watson family. An altar-tomb, in the chancel, bears the recumbent statue of a man in armour, with that of a female by his side; and on the entablatures are the figures of nine children, sculptured in relief. This tomb was erected in memory of Edward Watson, grandfather of the first lord Rockingham, and his wife, one of the daughters of sir Edward Montague, lord chief justice of the court of king's bench. Another handsome monument commemorates Lewis Thomas, lord Sondes, who died June 21, 1806. *Beauties of England*, &c. vol. xi. by John Britton, F.S.A. The History and Antiquities of Northamptonshire, compiled from MS. Collections of the late learned Antiquary, John Bridges, esq. by the Rev. P. Whalley, 2 vols. fol. Oxford, 1791.

ROCKINGHAM, one of the six counties into which the state of New Hampshire is divided. It lies on the S.E. part of the state, having the Atlantic on the S.E., the county of Hillsborough on the W., Strafford on the N., and the state of Massachusetts on the S.; about sixty miles long and thirty broad, and comprehending the only sea-port, and most of the commercial towns, in the state. The number of inhabitants is 50,175. Its chief towns are Portsmouth, Exeter, and Concord.—Also, the N.E. township in Windham county, Vermont, on the W. bank of Connecticut river, which separates it from Walpole, in New Hampshire. It contains 1954 inhabitants.—Also, a county of Salisbury district, in North Carolina, bounded E. by Caldwell, and W. by Stokes. This county is watered by the river Dan, on the banks of which are large tracks of low fertile land. Many parts of the county furnish iron ore. The number of inhabitants is 10,316.—Also, the chief town of Richmond county, North Carolina, situated on an eminence, about 6 miles E. of Great Pedee river, and containing a court-house, gaol, and a few dwelling-houses; 74 miles from Hillsborough.—Also, a mountainous county of Virginia, bounded N. by Shenandoah, and S. by Augusta. It contains 12,753 inhabitants.—Also, a post-town (usually called *Rocktown*, though its legal name is *Harrisonburg*) and the seat of the courts of the above county, situated on a branch of the Shenandoah river, and containing a court-house, gaol, and about 30 houses; 52 miles S.W. of Strasburg, in Pennsylvania.

ROCKINGHAM Bay, a bay on the N.E. coast of New Holland, N.W. of Cape Sandwich. This bay was so called by Cook in June 1770, who says that it is large, and appears to afford good shelter and good anchorage. The N. point of this bay is in S. lat. $17^{\circ} 59'$, and its boundary is formed by an island of considerable height, which is marked in the chart by the name of "Dunk Isle," and which lies so near the shore as not to be easily distinguished from it. The longitude of the N. point of the bay is $213^{\circ} 57' W.$

ROCKLAND, a county of New York, in the United States, on the W. side of Hudson river: it was separated from Orange county, and is now the southernmost county in the state on that side of the river, bounded by New Jersey S.W., Orange county N.W., and Hudson's river E. The number of inhabitants is 7758.

ROCKLINGEN, a town of Germany, in the margravate of Anspach; 2 miles N.E. of Wassertrudingen.

ROCKMANSTATT, a town of Bavaria, in the bishopric of Bamberg; 5 miles S.W. of Weisnain.

ROCKNABAD, *Abi Rocky*, a famous rivulet of the clearest water, about two feet broad, running between two gardens in the vicinity of Shirauz, in Persia. See *SMIRAUZ*.

ROCKSALT, a township of Philadelphia county, in Pennsylvania, containing 1508 inhabitants.

ROCKSALT, in *Mineralogy*. See *ROCK-SALT*.

ROCKY, in *Geography*, a small river of North Carolina, which discharges itself into Yadkin river.

ROCKY Bay, a bay on the E. coast of Labrador. N. lat. $53^{\circ} 30'$. W. long. $56^{\circ} 10'$.—Also, a bay on the coast of Terra del Fuego, in the straits of Magellan; 6 miles S.E. of Dolphin bay.—Also, a bay on the S.E. coast of Nova Scotia, N.E. of Halifax harbour.

ROCKY Island, a large rock in the river Detroit, Upper Canada, on the E. side of Grose ille, composed of limestone, lying in pretty regular strata.

ROCKY Meadow. See *PRAIRIE de Rocher*.

ROCKY Mount, lies in Catabau river, in the lowest part

part of Chester county, South Carolina, and is one of the largest fishing places in the southern states. It is said that a fisherman, with a hand net, sometimes takes 10 or 12,000 shad in a day.

Rocky Point, a cape on the S. coast of Jamaica, S. of Carlisle bay.—Also, a cape on the S. shore of lake Erie.—Also, a cape on the coast of New Albion. N. lat. $41^{\circ} 8'$. E. long. $236^{\circ} 5'$.—Also, a cape on the S.E. coast of Alaska, so named by Capt. Cook in 1778. N. lat. $55^{\circ} 10'$. E. long. $198^{\circ} 50'$.

Rocky River, a river of the Indiana territory, which runs into the E. side of Mississippi river, about 70 miles below the mouth of Misla river.

Rocky Land, in *Agriculture*, that sort which is much covered or beset with rocks or stones, either upon the surface or underneath it. Land of this kind is very common, and of considerable extent in many parts of the country, and, of course, often very injurious to the operations of tillage, as well as of planting, and many others. See **CLEARING**, and **RECLAIMING**, *Land*.

ROCO GRANDE, in *Geography*, an island on the coast of the Spanish Main, in the West Indies. N. lat. $11^{\circ} 5'$. W. long. $67^{\circ} 39'$.

ROCOU. See **ROUCOU**.

ROCQUIGNY, in *Geography*, a town of France, in the department of the Ardennes; 12 miles N. of Rethel.

ROCROY, a town of France, and principal place of a district, in the department of the Ardennes. The place contains 2875, and the canton 8077 inhabitants, on a territory of $237\frac{1}{2}$ kilometres, in 12 communes. N. lat. $49^{\circ} 55'$. E. long. $4^{\circ} 35'$.

ROD, VIRGA, Virge, a wand, or long slender stick, or staff. See **VERGE**.

Rod is also used for a land-measure of $16\frac{1}{2}$ feet: the same with perch and pole. It is likewise a long measure in Sweden, equal to 8 ells or 16 feet, the Swedish foot being to the English as 40 to 39. See **MEASURE**.

There are also local rods of seven yards and an half, or more. Likewise some of smaller lengths in particular places. See **WEIGHTS** and **MEASURES**.

ROD, in *Gauging*. See **GAUGING-Rod**.

ROD, in the *Manege*, called in French *gauge*, is a switch, held by the horseman in his right hand, partly to represent a sword, and partly to conduct the horse, and second the effects of the hand and heels.

ROD, Golden, or Aaron's, in *Botany*. See **GOLDEN-Rod**.

ROD, Shepherd's. See **TEAZEL**.

ROD, Golden, Tree. See **BOSEA**.

ROD-Knights, in *Ancient Customs*. See **REDMANS**.

ROD, Black. See **BLACK-Rod**, and **USHER**.

ROD, Ezekiel's. See **EZEKIEL**.

ROD, Fishing. See **FISHING**.

ROD, Rhineland. See **RHINELAND**.

RODA, in *Geography*, a town of Saxony, in Thuringia; 3 miles N. of Sangershausen.—Also, a town of Spain, in the province of Aragon; 20 miles S. of Ainsa.—Also, a town of Spain, in Catalonia, on the Tar; 6 miles N.N.E. of Vicque.—Also, a town of Saxony, in the principality of Altenburg; 28 miles W.S.W. of Altenburg.—Also, a river of Germany, which runs into the Mayne, 2 miles below Hanau.—Also, a town of Egypt, on the Nile; 3 miles E. of Ashmunein.

RODA, La, a town of Spain, in New Castile; 19 miles S. of Alarcon.

RODABERG. See **RÆTTVIK**.

RODACH, a town of Germany, in the principality of

Coburg; 6 miles W.N.W. of Coburg. N. lat. $50^{\circ} 21'$. E. long. $10^{\circ} 57'$. The town lies on a river of the same name, which runs into the Itfek, 6 miles S. of Coburg.

RODAK, a town of Hindoostan, in the country of Delhi; 50 miles E. of Hissar. N. lat. 29° . E. long. $76^{\circ} 35'$.

RODANSEE, a lake of the Ucker Mark of Brandenburg, S. of Templin.

RODAS, a town of South America, in the province of Popayan; 65 miles S. of Santa Fé de Antioquia.

RÓDATIO, unusual shortness of the eye-lashes.

RODAU, in *Geography*, a town of Saxony, in the Vogtland; 6 miles W. of Plauen.—Also, a river of Germany, which runs into the Wumme, 2 miles W. of Rotenburg, in the county of Verden.

RODAUN, a river of Prussia, which joins the Motlau at Dantzic, near which both together fall into the Vistula.

RODAW, a town of Prussia, in the province of Oberland; 14 miles E.N.E. of Marienwerder.

RODBYE, a sea-port town of Denmark, in the island of Laaland, with a convenient harbour. The principal article of trade is corn; 10 miles S.E. of Naskov. N. lat. $54^{\circ} 42'$. E. long. $11^{\circ} 24'$.

RODDA, a town of Arabia, in the province of Yemen; 4 miles N.W. of Sana.—Also, a town of Egypt, on the Nile, at the mouth of one of the branches of the canal of Joseph; 115 miles S. of Cairo.

RODDEN, a river of England, in the county of Salop, which runs into the Tern, 3 miles W. of Wellington.

RODDEN Cribs, in *Agriculture, a sort of large wicker-work basket, for containing the hay or other fodder in farmyards. It is observed by Mr. Marshall, in his "Rural Economy of the Vale of Gloucester," that these large baskets are made of the top wood of willow pollards, and are an utensil common to this county and to Lincolnshire, though situated on the opposite sides of the island: but they are alike grass-land counties, wherein cattle are fattened on hay. They are about six feet in diameter. The height of the basket-work is two feet and a half; of the stakes, three feet and a half; their heads rising about a foot above the basket. The width between the stakes twelve to fourteen inches. The size, that of large hedge-stakes. The thickness of the rods varies from that of a small hedge-stake, down to a well-sized edder.*

And in making these hay-baskets, the stakes are first driven in a ring of the required size firmly into the ground. Some of the larger rods are then wound in at the bottom, in the basket-work manner. Upon these the smaller rods are wound; the middle part of the work requiring the least strength, reserving the largest for the top. In the winding and due binding of those the principal part of the art of withy crib making rests. Some makers warm these thick rods in burning straw: others wind them cold; one man drawing them with a rope, while another beats them at the flake with a wooden beetle, until they acquire a degree of suppleness. They are mostly made by men who go about the country, and who by practice make them very completely; winding in the top rods so firmly and so regularly, that it is difficult to know which has been the last put in.

When in use, the cattle lay their necks between the tops of the stakes. Each being thus kept in its place, the master cattle are in a degree prevented from running round and driving away the underlings. The closeness of these cribs prevents a waste of hay, either by the wind or by the cattle. On the whole they are useful, simple, cheap, and if well made, will last several years.

RODEBACK, in *Geography*, a town of the duchy of Holstein; 10 miles E.N.E. of Braamsted.

RODELHEIM, a town of Germany, which gives title to a branch of the house of Solms; 3 miles W. of Francfort on the Maine.

RODEMACK, or **RODEMACHERON**, a town of France, in the department of the Moselle; 7 miles N. of Thionville.

RODEN, a town of the duchy of Wurzburg; 8 miles S. of Gemunden.—Also, a town of Prussia, in the palatinate of Culm; 4 miles N.W. of Bretchen.

RODENBERG, a town of Westphalia, in the county of Schauenburg, annexed to Hesse Cassel; near which is a medicinal spring; 4 miles S. of Hagenburg.

RODENBURG. See **ARDENBURG**.

RODENTHALL, a town of Saxony, in the circle of Erzgebirg; 6 miles E. of Chemnitz.

RODEO de Tata, a town of South America, in the province of Tucuman; 100 miles N. of St. Miguel de Tucuman.

RODER, Gros, a river of Saxony, which runs into the Schwartz Elster, 2 miles below Elsterwerda.

RODER, Klein, a river of Saxony, which runs into the Schwartz Elster, near Hertzberg.

RODERICKE, a town of Switzerland, in the canton of Berne; 3 miles S. of Aarburg.

RODERODE, a town of Germany, in the county of Henneberg; 4 miles E.N.E. of Smalkalden.

RODERSDORF, a town of Saxony; 4 miles S.W. of Plauen.

RODES, or **RHODEZ**, a town of France, and principal place of a district, in the department of the Aveyron, and capital of that department; before the revolution the see of a bishop, suffragan of Bourges; 32 miles N.N.E. of Alby. The place contains 6233, and the canton 12,168 inhabitants, on a territory of $247\frac{1}{2}$ kilometres, in 33 communes. N. lat. $44^{\circ} 21'$. E. long. $2^{\circ} 39'$.

RODHEIM, a town of Germany, in the county of Hanau Munzenberg; 9 miles N. of Francfort on the Maine.

RODIA, a town of Naples, in Capitanata, on the coast of the Adriatic; 14 miles W.N.W. of Vieste.

RODIALOWITZ, a town of Bohemia, in the circle of Boleflau; 12 miles S.E. of Jung Buntzel.

RODIGA, a town of Italy, in the duchy of Mantua; 9 miles N.W. of Mantua.

RODING, or **RODEN**, a river of England, in the county of Essex, which runs into the Thames, below Barking.

RODITZ, a town of Germany, in the principality of Culmbach; 2 miles W. of Hof.

RODNEY, GEORGE BRYDGES, in *Biography*, a celebrated naval commander, was the son of Henry Rodney, esq. of Walton on Thames, a naval officer, who commanded the yacht in which king George I., attended by the duke of Chandos, used to embark in going to or coming from Hanover, and who, in consequence, asked leave that his son might be called George Brydges. He was the second son, and born in 1718. At the desire, or by the command, of his royal and noble god-fathers, he entered early into the navy, and in 1742 he was lieutenant in the *Namur*, commanded by admiral Matthews. In November of the same year, he was promoted by the admiral to the command of the *Plymouth*, of sixty guns; on returning home he was removed into the *Sheernels*, a small frigate; and in 1744 he was appointed to the command of the *Ludlow-castle*, of forty-four guns. Captain Rodney was, during the war, very

successful, and attained to a considerable degree of professional eminence. In 1753 he married Miss Compton, daughter of Charles Compton, esq. and sister to Spencer, then earl of Northampton. In 1757 he was engaged, under the command of admirals Hawke and Boscawen, to attempt a descent on the coast of France, near Rochefort: and in 1759 he was advanced rear-admiral of the blue. In this same year he was sent to bombard Havre de Grace, where a large force was collected for the purpose of attempting an invasion of this country. He executed the trust committed to him so completely, that the town itself was several times on fire, and the magazines of stores and ammunition burnt with fury upwards of six hours, notwithstanding the exertions used to extinguish it. Thus had admiral Rodney the happiness of totally frustrating the design of the French court; and so completely did he destroy their preparations, that the fort itself, as a naval arsenal, was no longer, during the war, in a state to annoy Great Britain. In 1761 admiral Rodney was very instrumental in the capture of the islands of St. Pierre, Granada, St. Lucia, and St. Vincent, when the whole Caribbees came into the possession of the English. For his skill and bravery in the war, he was, after the conclusion of it, raised to the dignity of a baronet. In 1768, after an expensive, and to sir George Rodney a ruinous, contest with Mr. Howe, he was elected member of parliament for Northampton. His affairs were now so deranged that he exiled himself to France, the government of which had long since trembled at his name. The French king wished to take advantage of his pecuniary embarrassments, and through the duke de Biron made him the most unbounded offers, if he would quit the English for the French service. In reply to this shameful proposal, he said, "my distresses, sir, it is true, have driven me from the bosom of my country, but no temptation can estrange me from her service. Had this offer been voluntary on your part, I should have deemed it an insult, but I am glad to learn it proceeds from a source that can do no wrong." The duke was so struck with the patriotism of the admiral, that he became attached to him as a friend.

Before sir George Rodney's arrival in England, the French had united with the Americans in a war against this country. Towards the close of the year 1779, the chief command of the Leeward islands was given him; upon which he hoisted his flag on board the *Sandwich*. From this time he was very successful against his majesty's enemies, but our limits do not allow us to particularize all the advantages that resulted from his services during the remainder of the war of which we are speaking. In the first year he had done enough to obtain a vote of thanks from the house of lords; and the freedom of the cities of London and Edinburgh; but his great triumph, and that which must not be passed over, was on the 12th of April 1782, in an engagement in the West Indies with count de Grasse. This battle was fought among the islands of Guadaloupe, Dominique, the Saintes, and Marigalante. As soon as the day broke, admiral Rodney threw out the signal for close action, and every vessel obeyed it most scrupulously. The British line was formed at the distance of one cable's length between each ship. As the ships came up separately, they ranged close alongside their opponents, passing along the enemy for that purpose, giving and receiving, while thus taking their stations, a most dreadful and tremendous fire. The action continued in this manner till noon, when admiral Rodney resolved to carry into execution a manœuvre, which he expected would gain him a complete and decisive victory: for this purpose, in his own ship, the *Formidable*, supported by the *Namur*, the *Duke*, and the *Canada*, he bore down with all the sail set on

on the enemy's line, within three ships of the centre, and succeeded in breaking through it in a most masterly style. As soon as he had accomplished this, the other ships of his division followed him, and they all wore round, doubled on the enemy, and thus they placed between two fires those vessels which, by the first part of the manœuvre, they had cut off from the rest of the fleet. As soon as admiral Rodney, and the vessels which followed him, wore, he made the signal for the van to tack, by which means they gained the windward of the French, and completed the disorder and confusion, in which the *breaking of the line* had thrown them. One consequence of the breaking of the line was, that opportunities were given for desperate actions between single ships. The whole loss of the enemy on this occasion amounted to eight ships; one had been sunk, and another blown up after she had been taken, and six ships remained in possession of the conquerors. It was esteemed remarkably fortunate, and glorious for the victors, that de Grasse's ship, the *Ville de Paris*, was the only first rate man-of-war that had ever, at that time, been taken and carried into port by any commander of any nation. And this ship was on the present occasion fought so well, that when it struck there were but three men left alive and unhurt on the upper deck.

The British nation were so sensible of the bravery displayed both by officers and men in this action, and of the importance of it as the only means of preserving the remainder of the West India islands, that they manifested the most excessive joy when intelligence of the victory arrived. It came extremely seasonable in other points of view. Neither by land, nor by sea, except where admiral Rodney had been engaged, had we been able to meet the enemy, on any occasion, with great and decisive advantage; and, in too many instances, we had retired from the contest not in the most honourable manner. As the means of obtaining more favourable terms of peace, this important victory was hailed with joy and exultation; and as admiral Rodney was looked up to as the cause of it, the gratitude of the nation towards him was deeply felt, and expressed in warm and glowing language. It was recollected that the fortune of sir George Rodney had been peculiarly singular, as well as highly glorious in the war. Within little more than two years he had given a severe blow to each of our three powerful continental enemies, the French, Spaniards and Dutch. He had in that time taken an admiral of each nation; added twelve line of battle ships, all taken from the enemy, to the British navy; and destroyed five more. He received the unanimous thanks of both houses of parliament; and his majesty added dignity to the peerage of the realm, by calling the victorious admiral to a seat in the upper house.

It has been observed, that the victory of the 12th of April was gained by putting in practice an entirely new system of naval tactics, the adoption of which formed an era in our naval history, and may be regarded as the cause of the glorious victories, by which the fame of British seamen has been raised to such a pitch of glory; and the maritime power of our enemies in the late war, has not only been crippled, but absolutely annihilated. It has been said, in order to derogate from the honour of the admiral, that, in the instance of the 12th of April, it was the effect of chance, and not effected by the foresight of sir George Rodney. This idea has been satisfactorily exposed and refuted. The only question on the subject is, and into which we shall enter at large under the word *TACTICS, Naval*, whether the honour of the plan is due to admiral Rodney or Mr. Clerk, the author of a treatise on "Naval Tactics."

With the brilliant victory of the 12th of April sir George closed his professional career; to his title was added a pension of 2000*l.* to descend to his heirs. He died in London the 24th of May, 1792. For his important services to the West Indian islands in particular, a temple was built to receive his statue at Spanish Town, Jamaica.

A contemporary of the noble admiral said, that as an officer of nautical abilities, none were his superiors, and but few his equals. He possessed a bold and original genius, which always carried him directly to the object he had in view. As a man, he was benevolent, generous, and friendly. He has been known to be writing his private letters, and dictating to three secretaries at the same time. "In private life he displayed the manners of an accomplished gentleman; and he who, when called by his country, could hurl its thunders against the foes, and lead its navies to almost undeviating victory, was, in peace, the ornament of domestic society, and a pattern of that elegant and polished behaviour, which almost always distinguishes the higher orders among us." Stockdale's edition of Campbell's *Lives of the Admirals*.

RODNEY, Cape, a cape of New Zealand, being the N.W. point of the entrance into the river Thames. S. lat. 36° 15'. W. long. 184° 53'.

RODNEY Point, the N. point of Norton Sound, on the N.W. coast of North America, so called in honour of admiral Rodney. N. lat. 64° 30'. W. long. 166° 3'.

RODOE, a small island near the coast of Norway; four miles E.N.E. of Christiansand.

RODOLDESCO, a town of Italy, in the department of the Mincio; 10 miles S.E. of Mantua.

RODOLPH I., in *Biography*, emperor of Germany, founder of the imperial house of Austria, born in 1213, was the eldest son of Albert IV., count of Hapsburgh and landgrave of Alsace. He was brought up in the court and camp of the emperor Frederic II., and early distinguished himself by his courage and dexterity in martial exercises. On the death of his father, in 1240, he succeeded to a territory of moderate extent, which he endeavoured to augment by military enterprise. He entertained a band of adventurers of different nations, whom he employed either in defending him from his enemies, or in attempts to aggrandize himself at their expence. In 1245 he married a daughter of Burcard, count of Hohenburgh, with whom he obtained some accession of estates. Some years afterwards he served under Ottocar, king of Bohemia, against the Pagan Prussians. In 1273, as he was encamped before the walls of Basil, with whose bishop he was at enmity, he received the very unexpected intelligence, that he was unanimously elected king of the Romans.

Rodolph, then in his 55th year, willingly accepted the offered elevation, though sensible of the arduous task he was undertaking against the opposition of two unsuccessful candidates. He was crowned at Aix-la-Chapelle, and immediately strengthened himself by marrying two of his daughters to the count palatine of Bavaria, and duke of Saxony. He also took measures for ingratiating himself with the pope, Gregory X., who gave his sanction to the election. Alphonso, one of the unsuccessful candidates, was induced by the pope to renounce his pretensions; but Ottocar, the other, king of Bohemia, refused to acknowledge the new emperor, and manifested the bitterest animosity against him. The king of Bohemia was, at this time, one of the most powerful princes in Europe, and was distinguished by his abilities and military skill. Besides Bohemia and Bavaria, he possessed territories in the north of Germany and Hungary; and had lately acquired Austria, with Carinthia and

Carniola. Both parties having prepared for the contest, war broke out between the emperor and the king in 1275, and Rodolph commenced his operations with all the vigour of his character. He first marched against Henry, duke of Lower Bavaria, whom Ottocar had secured in his interest, and soon brought him to change his party. He then penetrated into Austria, and appeared under the walls of Vienna, before Ottocar thought of his danger. This prince, finding himself unable to save the Austrian capital, bent his haughty spirit to sue for peace, which was granted upon the condition of his renouncing his claims upon the Austrian provinces, and consenting to acknowledge the emperor, and do homage for Bohemia and his other fiefs. The Austrian provinces, as fiefs, devolved to the empire, and were taken possession of by the emperor.

The mind of Ottocar was so much irritated by the loss and disgrace he had undergone, that he could not bring himself to a faithful execution of the treaty, and the war was renewed in 1277. A fierce battle ensued, in which Rodolph was beaten to the ground by a Thuringian knight, and brought into great danger; but, on the other hand, Ottocar was killed, and his army entirely defeated. Rodolph was prevented from taking possession of Bohemia by Otho, margrave of Brandenburg, and he entered into an accommodation, by which Wenceslaus was acknowledged king of Bohemia, while he himself was to hold Moravia for five years, and was to retain the Austrian provinces. The securing of these to his family was thenceforth a great object of his policy, in which he encountered many difficulties, but at length he succeeded in settling them upon his two sons, Albert and Rodolph.

In the midst of these transactions, the emperor, thinking it would be for his honour to revive the imperial authority in Italy, after the death of Gregory, during the subsequent short-lived pontificate, sent commissaries into that country to exact homage from several of the towns; but, on the accession of Nicholas III. he found it expedient to confirm to the papal see its possessions in Romagna. He afterwards attempted to restore the authority of the empire in Tuscany; but in this he also failed, and was obliged to content himself with drawing large sums from Lucca and other cities for the confirmation of their privileges. No foreign foe now remaining, Rodolph turned his attention to the restoration of peace and order in Germany; and for this purpose it was necessary to enforce the laws against building private fortresses, which were the retreats of banditti, or the refuge of turbulent nobles, who defied all law and authority. Of these strong-holds he razed seventy in one year, condemning to death many of their owners for their violations of the public peace. He made many progresses through the imperial cities, administering justice and making salutary regulations, so that he obtained the title of "a living law," and deserved to be regarded as a second founder of the German empire. In 1283 he engaged in a war against Philip, count of Savoy, who had appropriated several imperial fiefs in Helvetia; but in an action near Morat he was overpowered by numbers, unhorsed, and obliged, for saving himself, to spring into the lake, where he supported himself by the branch of a tree till rescued by his followers. He was, however, victorious, and brought the count to terms of submission. He was likewise successful against the count of Burgundy, who had transferred his homage from the empire to France; but he failed in an attempt to gain possession of Bern, which had declared itself an independent republic. The troubles of Bohemia, in which the oppressions of the regent Otho had excited revolts, while the minor king, Wenceslaus, was detained as a prisoner, called Rodolph into that country. He

delivered Wenceslaus, whom he married to one of his daughters, and left him at the head of the government, in a state of tranquillity. The final object of this emperor was to secure the imperial crown to his only surviving son, Albert; but the electors were not to be persuaded into this measure, and Rodolph was severely mortified with the disappointment. His strength had already begun to fail, and as he was upon his way to Spire he was obliged to stop at Germerheim, where he died in July 1291, in the seventy-third year of his age, and the nineteenth of his reign.

There is scarcely an excellency of body or mind which the biographers of the house of Austria have not attributed to its founder; and it appears from the history of his actions, that few princes have surpassed him in energy of character, and civil and military talents. In the beginning of his career, he seems to have been little scrupulous in the means of aggrandizement; but, as an emperor, he was in general moderate and equitable. In his sixty-fourth year he married, for his second wife, a princess of Burgundy, only fourteen years of age, but no illue proceeded from this ill-forted union. By his first marriage he had a numerous offspring, of whom six daughters were all united to powerful families. *Mod. Univ. Hist.*

RODOLPH II., emperor of Germany, son of Maximilian II., was born in 1552. His father procured him the crown of Hungary in 1572, and that of Bohemia in 1575, together with the title of king of the Romans. On the death of Maximilian, in 1576, he succeeded to the imperial throne, being then regarded as a highly accomplished prince, conversant with various branches of knowledge. Unfortunately, his taste and acquirements were so far from qualifying him for the station to which he was elevated, that they diverted his attention from the principal duties of a sovereign. He was attached to mechanical inventions, and spent whole days in the shops of clock-makers, turners, and other artists. Chemistry was also one of his favourite studies, with its usual attendant in that age, alchemy. Having been educated among the Jesuits, his zeal for the Catholic religion rendered him unfriendly to those tolerating principles upon which his father had acted. He had succeeded to the sole possession of the territories of the house of Austria, and finding that the Protestant religion had spread in them to a degree that threatened to subvert the superiority of the Catholic, his first care was to restore the preponderance of the latter. His measures for this purpose occasioned revolts, and a total alienation of the minds of his Protestant subjects. In the other parts of the empire, Rodolph took part against the Protestants, and his interference was a principal cause of the deposition and expulsion of the archbishop and elector of Cologne, who had embraced the Protestant religion, and married. Troubles soon arose in his Hungarian dominions, where sultan Amurath III. made various incursions, in which he over-ran part of Hungary and Croatia. These were, however, chastised by several defeats given to the Turks by the imperial generals. But Mahomet III., the successor of Amurath, took the important town of Agria, in Upper Hungary, and war was maintained, with various fortune, in that kingdom, till a peace was concluded with sultan Achmet, in 1606. Rodolph took little personal share in these events, being chiefly occupied with his studies; and his Hungarian subjects had contracted such a contempt for his character, that they invited his brother, the archduke Matthias, to undertake the government, and in 1607 elected him for their king. Matthias prepared to take possession of his kingdom, and, marching with an army through Austria, projected to make himself master of that duchy. The timid and pacific Rodolph was persuaded to enter into a treaty with

with his brother, by which he ceded to him Hungary and Aultria, and Matthias was solemnly inaugurated as sovereign of those countries.

Soon after, disturbances arose in the empire on account of the disputed succession to the duchies of Juliers and Cleves, with which were affected the causes of dissention between the Catholics and Protestants of Germany. Confederations were formed, and both parties prepared for war. The emperor convoked diets, and diligently exerted himself, in order to prevent extremities. He, however, gave his chief confidence to his cousin the archduke Leopold, who, at length, marched into Bohemia, to awe the Protestants that had been rendered discontented, by attempts to introduce the infernal inquisition into the country, and by violations of their privileges. In this emergency they applied for assistance to Matthias, who entered Bohemia, and obliged Leopold to disband his troops. Not content with this success, he so wrought upon his brother, that Rodolph resigned to him his remaining kingdom of Bohemia, of which Matthias received the crown in 1611. Rodolph was, at that time, in a declining state of health; he died in January 1612, in the sixtieth year of his age, and thirty-sixth of his reign. It is said, that the predictions of the celebrated but superstitious astronomer Tycho Brahe, had rendered him distrustful of all his relations, so that he finally shut himself up in his palace, which he never quitted either for exercise or amusement. Among his various studies was that of astronomy, his attachment to which induced him to invite Tycho Brahe to Prague, where he was patronized till his death; and the same patronage was afterwards given to the more eminent Kepler. The Rodolphine tables, commenced by the former, and completed by the latter, have perpetuated the name of this emperor as a promoter of science. *Mod. Univ. Hist. Gen. Biog.*

RODOLPHE, —, one of the most celebrated professors on the French horn that ever existed. Though he usually played the second horn, he mounted as high as the first ever went. His execution was truly wonderful! and he had found the means of producing sounds with his instrument that were never heard before.

This able musician was equally powerful in composition as in performance. In 1773 he set "Jemona," a serious opera, for the marriage of the comte d'Artois. For the Italian theatre he had previously set, in 1765, the comic opera called "Marriage by Capitulation;" and, in 1767, "The blind Man of Palmyra."

RODOME, in *Geography*, a town of France, in the department of the Aude; 9 miles S.W. of Quillan.

RODON, a town of Sweden, in Jamptland, on lake Storsjö; 7 miles N.W. of Osterfund. — Also, a small island on the west side of the gulf of Bothnia. N. lat. 62° 23'. E. long. 17° 20'.

RODONDA, a small island at the entrance of the harbour of Rio Janeiro.

RODONI, *CAPE*, a cape on the coast of Albania, in the Adriatic. N. lat. 41° 55'. E. long. 19° 16'.

RODOPE, a mountain of Romania; 50 miles S. of Filippopoli.

RODOSTO, a town of European Turkey, in the province of Romania, on the north coast of the sea of Marmora, where the Armenians have one church, and the Greeks five. The environs are fertile in corn and wine; 53 miles N.E. of Gallipoli.

RODRIGO. See *CIVDAD Rodrigo*.

RODRIGUEZ. See *DIEGO Ruis*.

RODRIGUEZ Key, a small island on the coast of Florida. N. lat. 25°.

RODRIGUEZIA, in *Botany*, a genus so named in the *Flora Peruviana*, p. 105, after Emanuel Rodriguez, a Spanish botanist, apothecary to the king of Spain. *Des Theis*.

RODSEG, in *Geography*, a town of Iltria; 16 miles N.N.E. of Pedena.

ROE, *Sir THOMAS*, in *Biography*, a distinguished traveller and negociator, was born, in 1580, at Low Layton, in Essex. He was sent at an early age to Magdalen college, in Oxford: after he had left that seminary of learning, he passed some time at one of the inns of court. He was made an esquire of the body to queen Elizabeth, towards the close of her reign; and in 1604 he was knighted by king James. At the instigation of Henry, prince of Wales, he undertook an exploratory voyage to Guiana. Having fitted out a ship and pinnace at his own charge, and that of his friends, he sailed in 1609 for the river Amazons, up which he proceeded to the distance of 300 miles, landing in various places to examine the country. Having spent thirteen months in a laborious survey of this part of the American continent, in search of gold, no doubt, he returned to England in 1611. In 1614 he was sent, at the desire of the East India Company, as ambassador to the Mogul emperor, for the purpose of concluding a treaty of peace and commerce. He arrived at Surat in the autumn of that year, and resided at the Mogul court till the beginning of 1618. His conduct in this station did honour to himself and his country; and he made a great number of curious observations on the court and people, of which we have specimens in Purchas's Pilgrims. On his departure from this country, he visited the court of Schah Abbas in Persia, with whom he made a treaty, by which the East India Company obliged itself to assist him with a fleet, for the purpose of expelling the Portuguese from Ormus, on condition of being allowed a free trade with Persia. After his return, sir Thomas Roe was elected in 1620 a representative in parliament for Cirencester; and in the following year he was nominated ambassador to the Ottoman Porte, which post he occupied under the sultans Osman, Muftapha, and Amurath IV. He performed, in this capacity, some most important services for his country; and he was, at the same time, very serviceable to the Greek church, by protecting it from the oppressions of the Turkish ministers, and from the intrigues of the Jesuits, and other persons attached to the Papal see. In return for his various services, he was assisted in his collection of manuscripts in the Greek and Oriental languages, which he presented to the Bodleian library; and to his care was entrusted the celebrated Alexandrian manuscript of the Bible, presented to Charles I. by Cyril, patriarch of Constantinople. During his embassy, sir Thomas drew up "A true Relation of what lately happened in Constantinople, concerning the Death of Sultan Osman, and the setting up of Muftapha, his Uncle," &c. This was printed in London in 1622. He also kept minutes of his negociations at the Porte, which remained in manuscript till 1740, when they were published by the society for promoting learning, under the title of "The Negotiations of sir Thomas Roe, in his Embassy to the Ottoman Porte, from the Year 1621 to 1628 inclusive." After his return from Constantinople, he was sent, in 1629, to mediate a peace between Poland and Sweden. He was afterwards employed in negotiating a treaty with the king of Denmark at Copenhagen; and he went a second time to that court, and also to those of several German princes; and was present at the congress of Hamburg, and its removals to Ratilbon and Vienna. In 1640 he was a representative in parliament for the university of Oxford, and

and made several speeches upon very important occasions. While a member of parliament, he was sent, in 1641, to the diet at Ratisbon, to negotiate for the restoration of the late king of Bohemia's son to the Palatinate; and after his return, the king created him a privy-counsellor, and chancellor of the order of the Garter. The view of the approaching national disturbances was thought to have shortened his life, which was terminated in 1644. He left the character of a very able and upright minister, a true patriot, and accomplished gentleman. Besides the works already referred to, he left in manuscript "A compendious Relation of the Proceedings and Acts of the imperial Dyet, held at Ratisbon in 1640 and 1641;" and "A Journal of several Proceedings of the Knights of the Garter." *Biog. Brit.*

ROE, in *Geography*, a river of Ireland, in the county of Londonderry, which rising in the Cairntogher mountains, flows northward through Newtown Limavaddy into lough Foyle.—Also, the name of a small island in Clew bay, county of Mayo, Ireland.

ROE, La, a town of France, in the department of the Mayenne; 7 miles N.W. of Craon.

ROE of a fish is that part which contains the spawn or seed thereof.

That of the male fish is usually distinguished by the name of *soft roe*, or *milt*; that of the female by *hard roe*, or *spawn*.

The soft roe, when squeezed, yields a liquor resembling milk; whence its name *milt*. The French call it expressly *milk, lait*.

M. Petit found 342,144 ovula, or little eggs, in the hard roe of a carp eighteen inches long.

Leuwenhoeck, tom. ii. p. 216, only found 211,629 eggs in a carp, but four times the number in a cod; and, p. 188, he says, that a common cod contains 9,344,000 eggs; and that the eggs of a fish of one year old are as big as those of a fish of twenty-five years old. *Mem. Acad. R. Scien.* an. 1733, p. 290. See **MILT** and *Fecundity of Fish*.

ROE is also one of the beasts of chase.

ROE-Buck, the English name of the *cervus* with ramose, cylindric, and erect horns. It is the smallest of the deer-kind, and has been called *capreolus* and *caprea*, though without the least resemblance of the goat-kind. See **CERVUS** *Capreolus* and **DEER**.

The roe-buck is called a *hind* the first year; *gyrle*, the second; *benuse*, the third; *roe-buck of the first head*, the fourth; and a *fair roe-buck*, the fifth.

The roe-buck is a deer well known in Germany; and seems to have also been formerly found in England, though now the race be extinct.

ROE-Buck Hunting. See **HUNTING**.

ROE-Buck Island, in *Geography*, a small island in the gulf of Mexico, near the coast of West Florida. N. lat. 30° 17'. W. long. 88° 44'.—Also, a small island at the east extremity of lake Ontario.

ROE-Stone, *Oolite*, in *Mineralogy*, a variety of lime-stone, so called because it is composed of small round globules, supposed to resemble the roes of fishes, imbedded in a calcareous cement. These globules are composed of concentric lamellæ, and are evidently the result of crystallization. They vary in size from a grain of mustard-seed to that of a pea: when they are as large as the latter, it is called *pea-stone*. Roe-stone is one of the secondary lime-stones, which may be considered as belonging to the chalk-formation. It lies under chalk in various parts of England, being separated from it by beds of sand and clay. It is found also in many parts of Europe, but, according to Humboldt, is

not met with in South America. Some of the strata of this stone are extensively used for purposes of architecture: the most distinguished are the Ketten stone in Northamptonshire, the Bath fire-stone in Somersetshire, and Portland stone in the island of Portland. Portland stone is of a yellowish-white colour: the more compact varieties, when closely inspected, shew a tendency to crystalline arrangement; it is composed of carbonate of lime, with a small admixture of silica and alumine.

The island of Portland is properly an isthmus, situated in Weymouth bay, in the British Channel. The stone is got in every part of the island, but the quarries at Kingston are the most productive. According to Mr. Smeaton, the first stratum in the quarry is a dark coloured reddish earth, about one foot thick. To this succeed six feet of stone of an inferior quality, called *cap*. Immediately under this lies the roe-stone or free-stone, which is ten or twelve feet deep; and beneath this bed there is flint or clay. In some parts, irregular veins of quartz run through the roe-stone. The stratum of stone that is wrought for sale lies nearly parallel with the upper surface of the island; and, in general, the cover of earth and rubbish upon it is thin. Several beds of stone lie continuous one above another, varying in thickness from two to four feet, and sometimes more.

Portland stone was brought into repute in the reign of James I., and was employed in the construction of the banqueting-house at Whitehall. After the great fire in London, this stone was generally used by sir Christopher Wren in the construction of the new public edifices, as St. Paul's cathedral, the monument, and almost every building of note in the metropolis. See **STONE** for *Architecture*.

The different beds of roe-stone abound in marine organic remains, of which the pear enerinite is perhaps the most remarkable. In the lower beds are found the hippocephaloides, or horse-head muscles, which, according to Mr. Townson, are not casts, but petrifications of the fish itself, and do not represent the interior surface of the shells, from which they are perfectly distinct. This stratum also contains the anomia Spinosa of Linnæus. The spines are extremely delicate, and in some specimens are more than half an inch in length; from which circumstance we may infer, that the calcareous earth of this stratum was deposited in an extremely comminuted state, and in a tranquil element, otherwise it is almost impossible to conceive that these spines could have remained unbroken.

ROEDBACH, in *Geography*, a river of the duchy of Berg, which runs into the Rhine, two miles below Zons.

ROELL, HERMANN-ALEXANDER, in *Biography*, a celebrated Protestant divine, and theological professor, was born in 1653 at Doelberg, in Westphalia. He received an excellent education in the languages and elementary branches of science. In 1670 he went to the university of Utrecht, where he received lectures from the celebrated Francis Burmann on the scriptures; and on his return to Germany, he studied for some time at Marburg, and after that at Heidelberg. From thence he went to Basil and Zurich; and in 1676 he once more visited the United Provinces, and spent two years at the universities of Utrecht and Leyden. No sooner had he returned to his native country than he received an invitation to become pastor of the Protestant church at Cologne, which he declined, owing to ill health; and he undertook the chaplainship to Elizabeth, abbess of Hervorden, and daughter of Frederic, king of Bohemia; which post he retained till the death of the princeess, in 1680. After this he was appointed preacher to Albertine, princeess of Orange, and widow of William of Nassau; in whose household, and at Deventer, he exercised the

the ministry till the year 1686, when he was elected professor of divinity at the university of Franeker. In 1704 he accepted an invitation to fill the divinity chair at the university of Utrecht, a post which he retained with great reputation till his death in 1718, when he was in the 66th year of his age. He was author of many works chiefly on theological topics, among which are "A Commentary upon the Epistle to the Ephesians;" "An Analysis of the Epistle to the Colossians;" "An Analysis and Abridgment of the Prophetical Books of the Old Testament;" "Two philosophical Dissertations on Natural Religion, and one on Innate Ideas."

ROELLA, in *Botany*, so named by Linnæus, in Hort. Cliff. 492, to commemorate William Roëll, professor of anatomy at Amsterdam, who enriched Clifford's garden with many rare plants, the seeds of which he had procured from Africa and Japan. Among those from the Cape of Good Hope, was the first species of the present genus.—Linn. Gen. 88. Schreb. 118. Willd. Sp. Pl. v. 1. 918. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 353. Juss. 165. Lamarck Illustr. t. 123. Gært. t. 31.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Campanacea*, Linn. Jul.

Gen. Ch. *Cal.* Perianth superior, of one leaf, turbinate, permanent, in five large, deep, lanceolate, acute, toothed segments. *Cor.* of one petal, funnel-shaped, deciduous; tube rather shorter than the calyx; limb somewhat spreading, longer than the calyx, deeply five-cleft. Nectary of five converging scales, in the bottom of the corolla, permanent. *Stam.* Filaments five, awl-shaped, standing on the nectary; anthers awl-shaped, converging, equal in length to the filaments, and on a level with the calyx. *Pist.* Germen inferior, oblong; style thread-shaped, the length of the stamens; stigmas two, oblong, depressed, spreading. *Peric.* Capsule cylindrical, shorter than the calyx, crowned with its enlarged spreading segments, two-celled, bursting at the summit. *Seeds* numerous, angular.

Ess. Ch. Corolla funnel-shaped, closed at the bottom by valves bearing the stamens. Stigma in two segments. Capsule inferior, cylindrical, opening at the summit.

Obs. Linnæus attributes two cells to the capsule; Gærtner only one. Probably one may be occasionally abortive. The essential distinction seems to consist in the capsule having a vertical opening, instead of discharging the seeds by torn lateral orifices, as in *Campanula*, to which genus this is certainly, in other respects, very nearly allied. All the known species are natives of the Cape of Good Hope, being green-house plants in England, and having blue flowers.

1. *R. ciliata*. Ciliated Roella. Linn. Sp. Pl. 241. Hort. Cliff. t. 35. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 378. (*Campanula africana frutescens aculeosa, flore violaceo*; Comm. Hort. v. 2. 77. t. 39.)—Leaves lanceolate, fringed, with a prominent point. Flowers terminal, solitary.—Found in various parts of southern Africa. The Dutch have long cultivated it. Mr. Masson sent seeds to Kew in 1774. The plant is not very common, though much to be admired for the beauty of its flowers, which are produced in succession, throughout most part of the summer; but it is not easily increased, nor long preserved, being impatient of our damp winters. The stem is shrubby, of humble growth, branching in a determinate manner; the branches slender, round, leafy. Leaves copious, alternate, small, of a pale dull green, linear-lanceolate, fringed, each ending in a prominent, awl-shaped, rigid point. Flowers solitary at the ends of the branches, an inch and half, or more, in diameter, their colours well described by Curtis as follows. "The bottom of the flower is white, of a yellowish cast; next succeeds a

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circle of deep blue, inclining to black, with a surface highly glazed; the next circle is greyish-blue, resembling satin; the next nearly white, and the outermost, (or limb,) pale purple." Each leaf of the plant is accompanied by an axillary tuft of smaller, obtuse, entire, naked ones.

2. *R. squarrosa*. Trailing Roella. Linn. Suppl. 143. Thunb. Prodr. 38. Willd. n. 2. Ait. n. 2.—Leaves ovate, recurved, toothed, fringed. Flowers terminal, aggregate. Stem herbaceous, diffuse.—Gathered by Thunberg at the Cape, and sent from thence to Kew garden, by Masson, in 1787. It blossoms in June. The branches are more spreading and decumbent, as well as of a less shrubby nature, than the former. The *squarrosa* of Bergius, from whom the younger Linnæus adopted the name, is described as a shrub, with solitary flowers. Ours, besides the terminal tuft, has generally several scattered lateral flowers, on short leafy stalks, or branches, which may explain this apparent disagreement.

3. *R. decurrens*. Decurrent Roella. L'Herit. Sert. 4. t. 6. Willd. n. 3. Ait. n. 3.—Leaves lanceolate, entire, fringed, decurrent. Flowers solitary, terminal.—Sent from the Cape, by Mr. Masson, in 1787. This species is annual, flowering in September. The root is small and tapering. Stem much branched from the very bottom, spreading and partly decumbent, hairy. Leaves ovato-lanceolate, fringed, for the most part entire; strongly decurrent, so as to render the stem winged. Flowers terminal, sessile, pale blue, solitary, except occasionally on the most luxuriant branches.

4. *R. muscosa*. Mossy Roella. Linn. Suppl. 143. Willd. n. 4. Thunb. Prodr. 38.—Leaves ovate, toothed, reflexed, smooth. Flowers terminal, solitary. Stem herbaceous, diffuse.—Gathered at the Cape by Thunberg. A very small annual species.

5. *R. spicata*. Spiked Roella. Linn. Suppl. 143. Willd. n. 5. Thunb. Prodr. 38.—Leaves lanceolate, fringed, nearly entire. Flowers terminal, somewhat spiked. Stem shrubby, erect.—Found by Thunberg at the Cape. We have seen no specimen of this or the last.

Linnæus, in Sp. Pl. 241, has ? *R. reticulata*, adopted from Van Royen and Petiver, which appears to be no other than his own *Gorteria ciliaris*; *Cullumia ciliaris* of Brown, in Ait. Hort. Kew. v. 5. 137.

ROEMER, OLAVUS, in *Biography*, a Danish astronomer and mathematician, who flourished in the 17th and 18th centuries, was born at Arhusen, in Jutland, in the year 1644. From an elementary school at his native city he was sent to the university of Copenhagen, in 1662, where he distinguished himself by the progress which he made in his academical studies, and particularly in the mathematical sciences, which were the favourite subjects of his pursuit. By diligent study he had, in 1671, become so expert an astronomer, that, being introduced to M. Picard of the Academy of Sciences at Paris, who was sent by Louis XIV. to make astronomical observations in the northern regions, he was selected to accompany him when he returned to France. Here he presented him to the king, who appointed him mathematical preceptor to the dauphin, and settled a pension upon him. Roemer was united with Picard and Cassini in making astronomical observations, and in 1672 he was admitted a member of the Royal Academy of Sciences at Paris. He resided ten years at Paris, and acquired a high reputation by his many discoveries, among which was the very important one by which he ascertained the velocity with which light moves, by means of the eclipses of Jupiter's satellites. (See LIGHT.) This discovery was afterwards confirmed by Dr. Bradley. In 1681 Roemer was recalled to his own country by Christian V. king of Denmark,

who appointed him professor of astronomy, at the university of Copenhagen, and gave him the flattering title of *his own mathematician*, with a considerable salary. He was also employed in reforming the coin; improving the public buildings; regulating the weights and measures; and in surveying and laying out the high roads throughout the kingdom. In 1687 the king directed him to travel through Germany, France, England, and Holland, in order to collect such information, on a variety of points, as might be applied to beneficial purposes in Denmark. Upon his return home in the following year, he was made counsellor of the chancellor, and in 1693, assessor of the supreme tribunal of justice.

Christian V. was succeeded by Frederic IV. who appointed Roemer, in 1705, burgomaster of Copenhagen, and in 1706, honoured him with the dignity of counsellor of state. Roemer died in 1710, just as he was about to give the world the result of his observations. These, however, were published under the title of "Basis Astronomiæ," in 1753, by Peter Horrebow, who had been his disciple, and was, at the time, professor of astronomy at Copenhagen. Accounts of Roemer's astronomical observations, and some other of his pieces, will be found in the different volumes of the "Memoires" of the Royal Academy at Paris, particularly vols. i. and x.

ROENBERG, in *Geography*, a town of Brandenburg, in the New Mark; 8 miles E. of Zullichau.

ROENENG, a long measure in Siam, equal to one league, containing 4204 English yards, or 2½ miles nearly.

ROENSEL, in *Geography*, a river of the county of Mark, which runs into the Wipper, about a mile above Wipperfurt.

ROER, a river of Germany, which rises near Winterburg, and runs into the Rhine at Roerort.—Also, a river of France, which rises S. of Montjoe, in the department to which it gives name, and runs into the Meuse at Ruremond.

ROER, one of the three departments of the region of France, called the Reunited country; composed of the duchy of Juliers and a portion of the electorate of Cologne, situated in N. lat. 51°, on the left hand of the Rhine. It contains 6697 kilometres, or 259 square miles, and 516,246 inhabitants. It is divided into 4 circles or districts, 40 cantons, and 993 communes. The districts are Aix-la-Chapelle, including 165,261 inhabitants; Cologne, with 157,215; Crevelt, with 137,605; and Cleves, with 76,206 inhabitants. According to Haffenfratz, this department is 23 French leagues in length and 13 in breadth; and comprehends 4 circles, 40 cantons, and 324,960 inhabitants. Its capital is Aix-la-Chapelle. Its contributions, in the 11th year of the French era, were 4,564,150 fr. and its expences for administration and public instruction were 331,936 fr. 66 cents. Interspersed with heaths and marshes, this territory is, in general, fertile in grain, fruits, and pastures. It has mines of copper, iron, lead, and coal, with cold and hot mineral springs.

ROERMONT. See RUREMOND.

ROERORT, a town of the duchy of Cleves, at the conflux of the Roer and the Rhine; 15 miles N. of Duffeldorf.

ROESBACH, a river of the duchy of Berg, which runs into the Rhine at Duffeldorf.

ROESCHILD, ROSCHILD, *Roeskild*, or *Roskild*, a town of Denmark, in the island of Zealand, erected into a bishopric in the year 1012. In the year 1150 it was first encompassed with a rampart and ditch, and in 1268 or 1278 it obtained the privileges of a city. It gradually increased to such an extent as to contain 27 large churches and convents within its walls. Some of the churches of the neighbouring villages were included within its circuit, and its streets extended as far as the sea-shore. The kings of Denmark were

formerly elected and crowned in this city, and made it the place of their residence. Its subsequent decay has been owing to frequent fires, to the tyranny of its bishops, and also to the flourishing state of Copenhagen. The reformation contributed also to its decline, as the monks and clergy who spent a great part of their revenues in this place, were obliged to quit the country. At present Roeschild is a mean place, containing about 200 houses; the cathedral, built A. D. 930, where the royal families of Denmark have for many ages been buried; and the ruins of a royal palace. Here are some monuments worthy of attention, particularly four elegant mausolea in alabaster, of late kings and queens. The first king who was buried here was Harol Blacland, A. D. 980, and the last was Frederic V. surnamed the Great, A. D. 1766. The inhabitants support themselves chiefly by agriculture, and the planting of tobacco. In the year 1658, the famous peace of Roeschild, between the Swedes and Danes, was concluded here: 16 miles W. of Copenhagen. N. lat. 55° 39'. E. long. 12° 6'.

ROESCHULT, a town of Sweden, in the province of Smaland, said to be the native place of the famous Linnæus.

ROESENDAEL, a town of Brabant; 8 miles E. of Berg-op-Zoom.

ROESSEL. See ROSSEL.

ROETTVIK, or RAETTVIK, a mountain of Sweden, which, according to Bergman, is calcareous, and the height of which he estimates at 6000 feet above the sea; observing, as a singularity, that upon this mountain and that of Rodeberg, are found vast blocks of reddish felspar, mingled with quartz and brown mica.

ROEVAERT, a river of Brabant, which runs from Breda into the sea.

ROEULX, LA, a town of France, in the department of Gemappe; 8 miles N.E. of Mons.

ROEUX, a town of France, in the department of the straits of Calais; 9 miles E. of Arras.

ROFANI, a cape of European Turkey, on the S. coast of Romania. N. lat. 40° 35'. E. long. 24° 14'.

ROFFENSIS TEXTUS. See TEXTUS.

ROFRANO, in *Geography*, a town of Naples, in Principato Citra; nine miles N.W. of Policastro.

ROGA, a town of Naples, in the province of Otranto; seven miles N. of Otranto.

ROGA, *ρογα*, in *Antiquity*, a donative, or present, which the Augusti, or emperors, made to the senators, magistrates, and even the people; and the popes, or patriarchs, to their clergy.

The word is derived by some from the Latin *erogare*, to give, or distribute; according to others from *roga*, I ask; hence, say they, it is that St. Gregory the Great calls such distributions *precaria*, as being to be demanded in order to be had. Others, again, derive it from the Greek *ρογας*, sometimes used for *corn*; because it anciently consisted in corn, distributed among the populace, the soldiery, &c.

The emperors used to distribute these *rogæ* on the first day of the year, or on their birth-day, or on the natalis dies of the cities. The popes and patriarchs in Passion Week.

This custom of *rogæ*, or largesses, was introduced by the tribunes of the people, to gain the populace more effectually over to their interest. The emperors at length took it up, and made such distributions to the people, and even to the soldiery, who are hence called by the Greek writers of the middle age *ρογαλοποιεαι*.

ROGA is also used for the ordinary pay of the soldiery.

ROGA.

ROGANELLO, in *Geography*, a river of Naples, which runs into the gulf of Tarento, near Civita Mendrino.

ROGATCHEV, a town of Russia, in the government of Mogilev, on the Dnieper; 76 miles S. of Mogilev. N. lat. 52° 36'. E. long. 30° 14'.

ROGATIO, **ROGATION**, in the *Roman Jurisprudence*, a demand made by the consuls, or the tribunes, of the Roman people, when a law was proposed to be passed.

The demand was made in these terms: *Do you will and appoint that (for instance) war be declared against Philip?* This was the *rogatio*; and what the people returned in answer, as, *The Roman people do appoint war to be made against Philip*, was the *decretum*, *decree*, or *resolve*.

The word *rogatio* is frequently also used for the decree itself, to distinguish it from a *senatus-consultum*, or decree of the senate.

Frequently, also, *rogatio* is used in the same sense with *law*, because there never were any laws established among the Romans, but what was done by this kind of rogation. Otherwise they were null.

ROGATION WEEK, the week immediately preceding Whitsunday; thus called from three fasts therein; *viz.* on the Monday, Tuesday, and Wednesday, before Holy Thursday, or the Ascension of our Lord; called also *Rogations*, or *Rogation days*, because of the extraordinary prayers, and processions then made, for the fruits of the earth.

Dr. Godolphin says, the Rogation days derive their name from certain ordinances for abstinence, or days of fasting, which the bishop of Rome recommended to be observed by the Western churches, before he assumed the power of compulsion; and which he, therefore, called by the gentle name of *Rogation*, the time of abstinence being appointed at the beginning by that ordinance, which was called *Rogatio*, and not *lex*, or *decretum*.

The first who appointed these rogations was St. Mamertus, bishop of Vienne, who, in 474, assembled several bishops, to implore the mercy of God by a fast of three days, on occasion of an incursion then made into the country by a number of wild beasts. Others say, it was first set on foot by the same Mamertus, in 463, on occasion of some great public calamities.

His example was soon followed, first by the church of Clermont, in Auvergne, then by all their neighbours, and afterwards throughout all Gaul.

In 801, Leo III. confirmed this fast, and made it universal.

ROGATORES, among the Romans, those who in the *comitia centuriata* brought the chest into which the people threw the ballots containing their votes.

ROGE, in *Geography*, a town of Sweden, in the province of Skone; 28 miles N.W. of Christianstadt.

ROGEHAUSEN, a town of Prussia, in the palatinate of Culm; 21 miles N.E. of Culm.

ROGELGRUBE, a town of Prussia, in the Frische Nerung; 15 miles N.W. of Elbing.

ROGELIM, in *Scripture Geography*, a place of Judea, in the tribe of Gad, the residence of Barzillai; mentioned in the book of Kings.

ROGER, in *Biography*, first king of Sicily, born in 1097, was son of Roger, count of Sicily, and grandson of the Norman Tancred of Hauteville. He succeeded in his fourth year to the sovereignty of Sicily, under the guardianship of his mother Adelaide. As soon as he assumed the reins of government, he endeavoured to obtain the undivided possession of Palermo, of which a half belonged to

the elder branch of his family, and also to enlarge the bounds of his estates in Calabria. On the death of his relation, William, duke of Apulia, he was proclaimed at Reggio duke of Apulia and Calabria; but the pope, Honorius II., refused for some time to grant him an investiture to those duchies; at length, however, an accommodation was effected, and the pope became his friend. He was now a powerful prince, and being urged by some of his subjects to assume the regal title, he readily complied with their wishes. In 1130 he convoked an assembly of his barons at Palermo, and received with great pomp and ceremony the royal crown of Sicily from the hands of a cardinal, delegated for the purpose. He was invested at the same time with the principality of Capua and the dukedom of Naples. A rebellion broke out among his new subjects in Italy, which obliged him to retire to Salerno, and thence to Sicily. Roger, at this period, had espoused the cause of Anacletus, while the emperor Lothaire had espoused the cause of Innocent II., who was likewise acknowledged by several of the Italian states. A formidable confederacy was formed against Roger, in which the republic of Pisa, then a powerful maritime state, took a leading part. An active war was carried on for several years with various success in the south of Italy. In 1137 the emperor reduced the whole of Apulia, of which a new duke was created, while Roger was excommunicated by Innocent II. In 1139 he took the pope prisoner, who was obliged to purchase his liberty by the absolution of the king, and his investiture in Sicily, Apulia, and Capua. From this period the affairs of Roger became prosperous, and the successors of Innocent, who had refused to acknowledge his regal title, were brought to comply by the terror of his arms. About the year 1146, Roger carried his arms into Africa, and after reducing Malta, which from this period was annexed to the crown of Sicily, he made himself master of Tripoli, Tunis, and other extensive tracks along the sea-coast, which he rendered tributary. About the same time he avenged himself of the injustice of the Greek emperor, Manuel, who had imprisoned his ambassadors, and offered him other indignities, by sending a powerful fleet, which took the island of Corfu, and cruelly ravaged the coast of Morea. One result of this expedition was, the carrying off a number of silk manufacturers, and settling them in Apulia and Sicily, where they introduced their art. His admiral advanced as far as Constantinople, the suburbs of which he pillaged and burnt; and he had the honour of setting at liberty Lewis VII. of France, who, on his return from the Holy Land, had been intercepted by a Grecian squadron. Manuel, however, assisted by the Venetians, pursued and in part destroyed the Sicilian fleet, and recovered Corfu. Roger now associated his only surviving son with him on the throne, and after employing the last years of his life in erecting monuments of his munificence and piety, he expired at Palermo in the year 1154, in the 58th year of his age, and 25th of his reign as king, leaving the character of one of the ablest, most vigorous, and fortunate princes of his time. Gibbon, vol. x. Mod. Univer. Hist.

ROGER DE HOVEDEN, a learned historian of the 13th century, was probably born at the town of Hoveden or Howden, in Yorkshire, some time in the reign of Henry I. Having received the early parts of his education, he began to study the civil and canon law, which were then become the most fashionable branches of learning. He was appointed domestic chaplain to Henry II., who employed him in many ecclesiastical affairs, in which he acquitted himself with high honour. He is, however, best known by his *Annals of England*, from the year 731, where Bede's Ecclesiastical

History ends, to 1202. This work, which is one of the most voluminous of our ancient histories, is more valuable for the sincerity with which it is written, and the great variety of facts which it contains, than for the neatness of its style, or the regularity of its arrangement.

ROGERS, JOHN, an English divine, was educated at Cambridge, and became chaplain to the factory at Antwerp, where he assisted Tindal and Coverdale in translating the Bible into English. In the reign of Edward VI. he returned to England, and obtained a prebend in St. Paul's cathedral, where he was a frequent and zealous preacher. He was the first person executed in the reign of the bloody Mary, being burnt in Smithfield in 1555. In the former reign he had been, at least, an abettor of the same sort of persecution of which he himself became the victim. This fact deserves to be recorded. When the Protestant bishops had determined to burn Joan of Kent, a friend of Rogers, the divinity reader in St. Paul's church, came to him, earnestly desiring him to use his interest with the archbishop, that the poor woman's life might be spared, and other means used to prevent the spreading of her opinions, which might be done in time; urging, though that while she lived she infected few with her opinion, yet she might bring many to think well of it by suffering death for it; he pleaded, therefore, that it was better she should be kept in some prison, without an opportunity of propagating her notions among weak people; and so she would do no harm to others, and might live to repent herself. Rogers on the other hand pleaded, she ought to be put to death. Well then, says his friend, if you are resolved to put an end to her life, together with her opinions, choose some other kind of death more agreeable to the gentleness and mercy prescribed in the Gospel, there being no need that such tormenting deaths should be taken up in imitation of the Papists. Rogers answered, that burning alive was no cruel death, but easy enough. His friend, then hearing these words, which expressed so little regard to the poor creature's sufferings, answered him with great vehemence, and striking Rogers's hand, which he before held fast, said to him, "Well, it may perhaps so happen, that you yourselves shall have your hands full of that mild burning." And so it came to pass. Mr. Pierce, who has recorded this anecdote, conjectures with great probability, that the friend of Rogers was the historian himself.

ROGERS, captain Wood, a famous English navigator in the early part of the eighteenth century, of whose private history little is known, sailed in the Duke, a private ship of war, of 30 guns and 170 men, in company with the Duchess, a smaller vessel, commanded by captain Stephen Courtney, on an expedition into the South seas against the Spaniards. These ships were fitted out by a company of merchants at Bristol, and they set sail on the 1st of August, 1708. On board one of them as pilot was the afterwards celebrated captain DAMPIER, (see his article.) In passing the straits of Magellan, they not only captured several ships, but likewise took several towns upon the coast, and on the 22d of December 1709, they met with the famous Acapulco ship, which was the lesser of two ships, which at that period sailed annually from the East Indies to Mexico. She carried 20 guns, and would not surrender until she was overcome: an action began and lasted about half an hour, when the Spaniard hauled down her colours; and she was found to be a most valuable prize, worth 2,000,000 pieces of eight. After this they met with the larger Acapulco ship, but having skirmished two days, they found it impossible to capture her. They therefore deter-

mined to return by the East Indies, and arrived in the Downs after having circumnavigated the globe, on the 2d of October, 1711. This voyage, which was abundantly successful, led to the foundation of the SOUTH SEA COMPANY; which see. In 1718, captain Rogers having been appointed governor of the Bahama islands, proved himself well adapted to the situation, by the vigorous measures which he adopted against the pirates, who had become most inimical to the trading interests of the country. He arrived at Providence, after a short and easy passage, on the 11th of April, took possession of the town of Nassau, and the whole island, much to the satisfaction of the inhabitants, and many of the pirates, who had settled themselves there, submitted at once to his authority. He proceeded soon after in forming a council, and settling the government of those islands, appointing civil and military officers, raising militia, and taking every other step necessary for procuring safety at home, and security from any thing that might be attempted from abroad, in which by degrees he completely succeeded. Some of the pirates at first rejected the terms, and continued to do a good deal of mischief on the coast of Carolina; but when they saw that captain Rogers had thoroughly settled himself at Providence, and was not to be trifled with, and that the inhabitants of the Bahamas found it to be to their interest to be honest, they thought proper to solicit mercy; so that by the 1st of July, 1719, to which day the king's proclamation had been extended, there were not above three or four vessels of those pirates which continued to trade, two of these being captured, and their crews executed, the rest dispersed. "Thus," says the judicious Campbell, "in a short time, and chiefly through the steady and prudent conduct of governor Rogers, this herd of villains was in some measure dissolved, who for many years had frightened the West Indies and the northern colonies, coming at last to be so strong that few merchantmen were safe, and withal so cruel, that slavery among the Turks was preferable to falling into their hands." See Campbell's Lives of the Admirals, Stockdale's edition, vols. iii. and iv.

ROGERS, BENJAMIN, doctor of music, an ecclesiastical composer, whose works are still contained in our cathedral service, and for whose fame Anthony Wood has manifested great zeal. This musician was born at Windsor, and brought up in that college under Dr. Nath. Giles; being employed there, first as a singing boy, and afterwards in the capacity of lay clerk or singing man. Thence he went to Ireland, and was appointed organist of Christ-church in Dublin, where he continued till the breaking out of the rebellion, in 1641; at which time, being forced to quit his station, he returned to Windsor, where he was again reinstated as choirman; but being soon after silenced in consequence of the civil wars, he procured a subsistence by teaching in the neighbourhood. And during this time, according to his friend Ant. Wood, having addicted himself much to study, he acquired great credit as a composer, and produced several sets of airs in four parts for violins and an organ, which being then imagined the best that could be composed of that kind, were sent as great rarities to the archduke Leopold, afterwards emperor, and himself a great musician; and, upon their being performed by his band, they were very much admired.

In 1658, by the favour of his friend Dr. Ingelo, he obtained the degree of bachelor in music at Cambridge, and acquired great reputation in that university by his exercise. Soon after, on Dr. Ingelo going chaplain to Bullstrode lord Whitelock, into Sweden, he carried with him some of Ben. Rogers's best compositions, which, upon being repeatedly

peatedly performed in the presence of Christiana, queen of Sweden, were very much applauded.

At the Restoration he was appointed to compose the music that was performed at Guildhall, on the day his majesty and his brothers, the dukes of York and Gloucester, dined there with the lord mayor, by which he greatly increased his reputation.

About this time he was chosen organist of Eton college, which he resigned soon after, on being invited to Oxford, where he was appointed to the same office in Magdalen college. And in 1669, upon opening the new theatre in that city, he was created doctor in music. He continued, says Ant. Wood, in the university, where he was much esteemed, till the year 1685, when he was ejected, in company with the fellows of his college, by king James II. after which he long resided in the skirts of the town, wholly disregarded.

“His compositions for instruments,” says Ant. Wood, “whether in two, three, or four parts, have been highly valued, and were thirty years ago always first called for, taken out and played as well in the public music schools, as in private chambers: and Dr. Wilson, the professor, (the greatest and most curious judge of music that ever was,) usually wept when he heard them well performed, as being wrapt up in an ecstasy; or, if you will, melted down: while others smiled, or had their hands and eyes lifted up, at the excellence of them.”

It is to be feared, that instead of *weeping*, the wicked lovers of modern music would now *laugh*, if they were to hear the quaint and starchy strains, and see on paper the ruffs and roll-ups of honest Ben. Rogers at the Opera-house, or professional concert, Hanover-square. But, alas! what is the secular music, that thirty years have not wrinkled, withered, and rendered superannuated!

ROGERS'S *Point*, in *Geography*, a cape on the W. side of lake Huron. N. lat. $44^{\circ} 19'$. W. long. $82^{\circ} 45'$.

ROGERSVILLE, the chief town of Hawkins county, in the state of Tennessee, pleasantly situated in Carter's valley, with a prospect agreeably variegated by some round hills at a distance. It contains about 20 dwelling-houses, some public buildings, stores, &c. It has a number of perennial springs, and one above the level of the streets.

ROGETS, a town of the duchy of Magdeburg, at the conflux of the Oura and Elbe; 16 miles N. of Magdeburg.

ROGGENDORF, a town of Austria; 8 miles W. of Aggspach.

ROGGEWELD, a transmontane division of the district of Stellenbosch and Drakenstein, at the Cape of Good Hope, called the Rye-grass country, and divided into Upper, Middle and Little. These are the summit of a long extended Table mountain, whose western front rises out of the Karroo plains, behind the Bokkeweld, almost perpendicularly, to the height of two or three thousand feet. Stretching to the eastward, this summit becomes more broken into inequalities of surface, and rises at length into the mountains of Nieuweld, the Camdeboo, and the Seeuwberg, which may be considered as one extended chain. The great elevation of the Roggeweld, and its being surrounded by the Karroo plains, make the temperature in winter so cold, that for four months in the year, the inhabitants are under the necessity of descending to the feet of the mountains, with their horses, cattle, and sheep. The strongest and largest breed of horses in the whole colony is that of the Roggeweld. See NIEUWELD.

ROGIERS, a town of France, in the department of the Var; 4 miles S. of St. Maximin.

ROGLIANO, a town of Naples, in Calabria Citra; 9 miles S.S.E. of Cosenza.—Also, a town of the island of Corsica; 20 miles N. of Bastia.

ROGME, in *Surgery*, a rupture or fracture.

ROGNES, in *Geography*, a town of France, in the department of the Mouths of the Rhone; 13 miles N.W. of Aix.

ROGO, an island of Sweden, near the E. coast, in the Baltic. N. lat. $57^{\circ} 53'$. E. long. $16^{\circ} 36'$.

ROGONATGUNGE, a town of Bengal; 30 miles S.W. of Rogonatpour. N. lat. $23^{\circ} 17'$. E. long. $86^{\circ} 21'$.

ROGONATPOUR, a town of Bengal, and capital of the circar of Pachete; 150 miles S.S.E. of Patna. N. lat. $23^{\circ} 33'$. E. long. $85^{\circ} 44'$.—Also, a town of Bengal; 31 miles S.E. of Kishenagur.

ROGOSNO, a town of the duchy of Warsaw; 16 miles N. of Posen.

ROGOWA, a town of Prussia, in the palatinate of Culm; 7 miles E. of Thorn.

ROGSTA, a town of Sweden, in Helplingland; 2 miles N.E. of Hudwickwall.

ROGUE, in *Law*, an idle and sturdy beggar, who, by ancient statutes, for the first offence, is called a *rogue of the first degree*, and punished by whipping, and boring through the gristle of the right ear, with a hot iron, an inch in compass; and, for the second offence, is called a *rogue of the second degree*, and ordered to be put to death as a felon, if he be above eighteen years of age. For the description and punishment of rogues, as they are established by 17 Geo. II. cap. 5, see VAGABOND.

ROGUES, or *Whores' March*, in *Military Language*, a beat of the drum, accompanied by the fifes, when a soldier is drummed out of the regiment, or common prostitutes are drummed out of camp or garrison.

ROGUES *Yarn*, a name given to a rope-yarn, which is placed in the middle of every strand, in all cables and cordage in the king's service. It differs from all the rest, as being untarred and twisted in a contrary manner, by which it is easily discovered. The use of this contrivance is to examine whether any cordage, supposed to be stolen or embezzled, has been formed for the king's service, the possessor of which is subject to a heavy fine. Falconer.

ROGUINS, in *Geography*, a town of France, in the department of the Rhone and Loire; 6 miles E. of Roanne.

ROGUN, a town of European Turkey, in Albania; 6 miles W.N.W. of Arta.

ROHACZOW, a town of Lithuania, in the palatinate of Minsk, on the Dnieper; 85 miles S.E. of Minsk. N. lat. $52^{\circ} 50'$. E. long. $29^{\circ} 33'$.

ROHALE, a small island on the W. side of the gulf of Bothnia, N. lat. $60^{\circ} 37'$. E. long. $17^{\circ} 49'$.

ROHAN, HENRY, *duke of*, in *Biography*, second of the name, but one of the first rank, talents, and character of the French nobility of his time, was born in 1579, at the castle of Blein, in Brittany. At the age of sixteen he distinguished himself at the siege of Amiens, under the eye of Henry IV., to whom he was presumptive heir, before the birth of the dauphin. After the death of Henry, he was at the head of the Calvinist party in France, a station which he retained during three religious wars against the authority of Lewis XIII. In the first, in 1621, he defended Montauban in person: the siege was raised, and in the following year a favourable peace was granted to the Protestants. The war was rekindled in 1625, but was soon terminated by a peace. At length Richelieu resolved entirely to subdue a party which had become a sort of separate republic

in France, allied for its own defence with her enemies. He besieged and took Rochelle, the strong hold of the Calvinists; and though the duke of Rohan vigorously maintained the war in Languedoc, he was at length obliged, in 1629, to make his submission, and the party was deprived of all its fortresses, but still allowed the public exercise of its religion. To some of the most violent, who were enraged at the terms of accommodation, and accused their chief of having sold them, he presented his naked breast, saying, "Strike! I am content to die by your hands, after having ventured my life in your service." As it was one of the conditions that he should quit the kingdom till it pleased the king to recall him, he retired to Venice, and it is affirmed, that, during his residence in that city, the duke engaged in a negotiation with the Ottoman Porte, for the purchase of the island of Cyprus, with a view of settling in it Protestant refugees from France and Germany, and that it failed principally through the death of the patriarch Cyril, by whose mediation it was carried on. The Venetian republic nominated him its general in chief against the Imperialists; but the king of France took him from its service to send him ambassador to the Swiss and Grisons. At the head of the troops of the latter, he drove the Germans and Spaniards out of the Valtellin in 1633. He after this defeated the Spaniards on the banks of the lake Como, but the Grisons becoming suspicious that it was not intended to withdraw the French troops from their country, rose in arms, and the duke was obliged to make a separate treaty with them in 1637. He now retired to Geneva, and from thence went to join his friend, the duke of Saxe-Weimar, with whom he fought against the Imperialists at Rheinfeld, in 1638. He was severely wounded in the action, and died some weeks after, at the abbey of Konigfeld, in Switzerland, at the age of fifty-nine. His body was interred in the church of St. Peter, at Geneva, where a magnificent monument was erected to his memory. The duke was author of several works, military and political. These are, "Les Intérêts des Princes;" "Le parfait Capitaine, ou l'Abrégé des Commentaires de César;" "Un Traité de la Corruption de la Milice ancienne;" "Un Traité du Gouvernement des Treize Cantons;" "Mémoires," containing the transactions in France from 1610 to 1629; "Recueil des quelque Discours politiques sur les Affaires de l'Etat, depuis 1612 jusqu'en 1629;" "Mémoires et Lettres de Henri, duc de Rohan, sur la Guerre de la Valtelin." The duke was one of the greatest captains of his time, and possessed all the qualities requisite in the head of a party, together with disinterestedness, generosity, and gentleness of manners. His wife, Margaret of Bethune, daughter of the great duke of Sully, warmly espoused the interests of her husband and party, and was greatly celebrated for her courage. His brother also, Benjamin de Rohan, lord of Soubise, acted a distinguished part in the Calvinist wars, and finally took refuge in England, where he died in 1690.

ROMAN, in *Geography*, a town of France, in the department of the Morbihan, and chief place of a canton, in the district of Plöermel; 10 miles N.W. of Josselin. The place contains 422, and the canton 9951 inhabitants, on a territory of 267½ kilometres, in 9 communes. N. lat. 48° 6'. W. long. 2° 40'.

ROHAN-ROHAN, a town of France, in the department of the Two Seves; 6 miles S.S.W. of Niort.

ROHAULT, JAMES, in *Biography*, a French philosopher and mathematician, was born at Amiens, in Picardy, in 1620. Having received the early part of his education at his native place, he was sent to Paris, to study mathematics and philosophy. In his enquiries he appears to have been

possessed of an ardent love of truth, and to have fought after it with the utmost diligence and impartiality. He studied both the ancients and moderns, but Des Cartes was the author which engaged most of his notice, and of that celebrated philosopher he became a zealous follower. His attachment to the system of Des Cartes introduced him to the acquaintance of Claude Clerfelier, who gave him his daughter in marriage, in opposition to the remonstrances of his family. He engaged his son-in-law to draw up an abridgment and explanation of the philosophical works of Des Cartes, and to illustrate the same with notes. The result of his labours, which he entitled "Physics," was taught by him at Paris, during ten or twelve years before he gave it to the public. Rohault died in the year 1675, at the age of fifty-five, leaving behind him the character of an amiable, as well as very learned man. His Physics were translated from the French into Latin by Dr. Samuel Clarke, who accompanied his version with notes that overset the system of Des Cartes, in order to make way for that of the illustrious sir Isaac Newton. The best edition of this translation is that of 1718. Rohault also published "Elements of Mathematics," and "Dialogues concerning Philosophy;" and after the author's death, a collection of pieces was made from his manuscripts, and printed first at Paris, and afterwards at the Hague, in 1690, in two vols. 12mo. containing the first books of Euclid, Trigonometry, Practical Geometry, Fortification, Mechanics, Perspective, &c.

ROHBA, in *Geography*, a town of Arabia, in the province of Hedsjas; 10 miles S. of Vadelkora.

ROHEETA, a town of Hindoostan, in the circar of Gohud; 20 miles S.E. of Gohud.

ROHILCUND, or **ROHILLA**, a circar or province of Hindoostan, situated on the E. side of the Ganges, and N.W. of the subah of Oude. The territory of the Rohillas was formerly called Cather, and recently derived its name from the conquerors of that tribe, who, about the year 1720, left Afghanistan, and the mountains which they occupied between India and Persia, and came thither in pursuit of military service. These emigrants were first entertained by Madar Saha, the Hindoo chief of Serowly, a small town in the N.W. quarter of Rohilcund, who, by robbery and predatory excursions, maintained a large party of banditti. Some time afterwards, the Rohillas quarrelled with Madar Saha, and associated with the chief of Bareilly; but, separating from this chief, they made incursions into the territory of the rajah of Kemaon. In this expedition they at first succeeded, but were afterwards defeated; their leader, who was an original emigrant from Afghanistan, being taken prisoner and put to death. After his death, his associate, Ali Mahomet, a youth of the sect of Jats, whom he had captured in one of his excursions, and brought up in the Mahometan religion, became the chief of the party; and being brave and enterprising, though young, he availed himself of every opportunity that occurred for advancing his power, and enlarging his territory. Ali, chiefly by the assistance of the vizier Kummer ud Dein, obtained a commission for collecting the revenue of the pension land, which, it is said, he punctually remitted. From this period we may date the first establishment of the Rohilla power in Rohilcund, the name by which they distinguished the Cutterah or Kutterah districts, and their other territories on the east side of the Ganges. Ali Mahomet fixed his residence at Owlah, and established throughout his territory a permanent system of government, which, though occasionally rigorous, afforded protection to the lower class of people. In process of time, and in consequence of several predatory acts which he committed, Ali was attacked by the prince Mahomet Shah,

Shah, who entered Rohilcund with a powerful armament, and took possession of the open country. At length he was compelled to surrender himself to the king, but by the intercession of Kummer ud Dein he was pardoned. With this event, which happened in the year 1745, the power of the Rohillas was annihilated in Rohilcund; and all their officers and principal people were removed to Delhi. Ali, having remained about a year at Delhi, under the protection of the vizier, was, by his recommendation, appointed the military governor of Sirhind, who, during his residence in this place, was joined by a body of 2000 or 3000 marauding Afghans; so that his party was computed to consist of 10,000 cavalry, and 15,000 or 20,000 infantry, of various denominations. Whilst the Mogul and Afghan armies were preparing for action, he quitted the Panjab and retired to Hurdwar, from whence he penetrated, in 1747, into Rohilcund, which he rapidly conquered, and soon after died at Owlah. The last army that might be reckoned *imperial*, was, in 1749, defeated by the Rohillas; by which their independency was firmly established in the eastern part of the province of Delhi. About the year 1750, the territory which had been personally possessed by Ali Mahomet, was, by the deliberation and agreement of the principal Rohilla officers, divided among his sons. At length, however, Hafiz Ahmed, who possessed military talents, in the exercise of which he had acquired influence in Rohilcund, superseded the authority of Saud Ullah, the third son of Ali Mahomet, and was advanced to the supreme administration of affairs; and at the death of Saud Ullah, which happened at Owlah in 1761, the power of Hafiz was established. The form of government adopted by the Rohillas in India, similar to that which subsisted in their native country, may be denominated feudal. The successors of one of the first invaders, viz. Daud Khan, possessing very moderate hereditary pretensions, and surrounded by persons who had afforded essential assistance in the first conquest, held but a limited sway. Two of the most respectable of the Rohillas never ceased to oppose the progress of Hafiz Rhamut, who aimed at sovereign authority; but zealously attached to the interest of the widow of Saud Ullah, they formed a counterpoise to the encroaching power of that chief. The Afghan conquerors of Rohilcund, were a bold, rapacious, and lawless set of men; and after they had established a kind of government in India, they adopted the more effeminate vices of the south, and became intriguing, deceitful, and treacherous. The Rohillas, particularly those of the lower class, were, with few exceptions, the only Mahometans in India who exercised the profession of husbandry, and their attention to agriculture was amply recompensed by the abundance and superior qualities of the productions of Rohilcund. This country is said to have yielded to the Rohillas one million sterling, a sum which, in later times, has been very considerably reduced. According to Mr. Hamilton, the Rohillas themselves have been the great cause of the ruin of the country which bears their name; it was parcelled out among their chiefs, who had afterwards but a feeble connection with each other; while their dependence on Hafiz (Hafley) Rhamut, their prince, was more nominal than real. In the year 1773 the Mahrattas crossed the Ganges to invade the Rohilla country; but a brigade of the British marched to the western frontier of that country, and drove the Mahrattas across the river. For this protection the Rohilla chiefs had stipulated to pay Sujah Dowlah, nabob of Oude, 40 lacks of rupees; but when this essential service was performed by the British army, which moved as the allies of Sujah Dowlah, the payment of the money was evaded. This breach of treaty led to the invasion

and conquest of the Rohilla country in the following year, 1774: and it was then added to the subah of Oude. Since this conquest, the country has rapidly degenerated into a waste, under the deleterious politics of the ministers of Oude. The natives are said to be a tall, handsome race of people; and when compared with the other inhabitants, are white and well featured. They continued for a considerable time to carry about in triumph some couches and palanquins of European officers that were killed by their army in the fatal action of 1774, by which we purchased a victory at a greater expence of European lives than was ever suffered by the same number of troops in India. The capital of Rohilcund is *Bereilly* or *Bareilly*, which see. The district of Rampour, situated at the foot of the Northern mountains, and possessed by a Rohilla chief, is included in Rohilcund, but it was ceded to Fizzoolah Cawn, the chief, by the treaty of Loldong, in 1774. It is valued at 30 lacks of rupees *per annum*; but he is, in effect, tributary to *Oude*, (which see,) by being bound to furnish his quota towards an establishment for the common defence.

ROHILLAMOW, a town of Hindoostan, in Oude; 21 miles S.S.E. of Kairabad.

ROHINI, in *Astronomy*, the Sanskrit name of a star, supposed to be that designated on our globes by α Tauri. In mythology it is an asterism that furnishes more poetical allusion than any other in the zodiac. Rohini is one of the sixty daughters of Daksha, and one of the twenty-seven espoused by Soma, or the moon; the lunar regent being male among the Hindoos, as it is with some European mythologists. (See SOMA.) Under the article NAKSHATRA, which means the asterisms marking the moon's path, mention is made of the poetical derivations from this fruitful source, and we will here add another instance of it, relating to Rohini, the favourite consort of the sickle Soma. In one of their terrestrial journies, arriving at the southern mountain Sahyadri, they unwarily entered the forest of Gauri, or Parvati, where some men, having formerly surprised Mahadeva caressing that goddess, they were punished by a change of their sex, and the forest had retained a power of effecting a like change on all males who should enter it. Soma, or Chandra, instantly becoming a female, (Chandri,) was so afflicted and ashamed, that he hastened far to the west, sending Rohini to her seat in the sky, and concealed herself in a mountain, afterwards named Somagiri, where she performed acts of the most rigorous devotion. Darkness then covered the world each night, the fruits of the earth were destroyed, and the universe was in such dismay, that the Devas, or divinities, with Brahma at their head, implored the assistance of Mahadeva, who, placing Chandri on his head, she became male again. Mahadeva, in statues and pictures, is usually seen with the moon on his head and forehead, and one of his names is Chandra-sekra, or *moon-crowned*. (See SIVA.) Another fable states that she was visited in her retreat by Surya, or the sun, from which conjunction arose a numerous progeny. Mahadeva is the sun; and this sol-lunarian progeny is, perhaps, vegetation. Under the article ILA is another lunarian fable, probably connected with these. Siva's spouse, Parvati, is as jealous as Juno.

These fables, taken from the Asiatic Researches, vol. iii. are related by Mr. Wilford, from Puranic authority; and were thus explained to him by an ingenious Pandit. To the inhabitant of the countries near the source of the Kali, or Nile, the moon, being in the mansion of Rohini, or the Pleiades, seemed to vanish behind the southern mountains. Now when the moon is in opposition to the sun, it is the god Chandra; in conjunction, the goddess Chandri. The moon is believed, by Hindoo naturalists, to have a power-

ful influence on vegetation, especially on certain plants, and, above all, on the Somalata, or moon-plant. (See SOMALATA.) This mode of interpretation, Mr. Wilford adds, may serve as a clue to the intricate labyrinth of the Puranas, which contain all the history, physiology, and science of the Indians and Egyptians, disguised under similar fables. See PURANA.

ROHITZ, in *Geography*, a town of Stiria, in which is a medicinal spring; 20 miles E. of Cilley.

ROHL, a small island in the gulf of Finland. N. lat. $59^{\circ} 55'$. E. long. $26^{\circ} 26'$.

ROHLA, a river of Bohemia, which runs into the Egra, near Carlsbad.

ROHN, a town of Germany, in the county of Henneberg; two miles N.N.W. of Salzungen.

ROHN. See PULO Ron, and POOLARON.

ROHND, a town of Bengal; 15 miles N. of Toree.

ROHOB, a town of Judea, in the tribe of Asher, mentioned in the books of Joshua and Numbers. To this place Moses sent twelve men to reconnoitre the land of promise. It was assigned to the Levites of the family of Gershon.

ROHOSSETZ, a town of Bohemia, in the circle of Bolelaw; eight miles N.W. of Turnau.

ROHR, a town of the duchy of Stiria; nine miles W. of Gnaa.—Also, a river of the duchy of Bremen, which runs into the Wefer near Carlsburg.—Also, a town of Germany, in the principality of Culmbach; five miles S.E. of Culmbach.—Also, a town of Germany, in the county of Henneberg; two miles E. of Meinungen.

ROHR, Inn, a town of Austria; 10 miles N.W. of Neutadt.

RÖHRBACH, a town of Germany, belonging to the priory of Odenheim; 10 miles W. of Heilbronn.

ROHRBECK, a town of Saxony, in the principality of Querfurt; two miles S. of Juterbock.

ROHRIA, in *Botany*, a genus of Schreber's, has been supposed, by De Theis, to commemorate Julius Bernard von Rohr, a German botanical writer of the middle of the 18th century, whose works are little known out of his own country. We rather presume, with professor Martyn, that the author of this name had in view a more recent, and very eminent, practical botanist, long resident in South America, Julius Philip Benjamin von Rohr, perhaps a relation of the former, whose discoveries are often mentioned by Vahl, and who has written on *Quassia amara*, the culture of Cotton, and other subjects. Thunberg has also a *Robria*, adopted from Vahl; which having been previously called *Berckheya*, by Ehrhart, is now retained under the latter name in Willd. Sp. Pl. v. 3. 2269.—Schreb. Gen. 30. Willd. Sp. Pl. v. 1. 186. Mart. Mill. Dict. v. 4. (Tapura? Aubl. Guian. v. 1. 126. Juss. 419. Lamarck Illustr. t. 122.)—Class and order, *Triandria Monogynia*. Nat. Ord. uncertain, Juss.

Gen. Ch. Cal. Perianth inferior, of one leaf, bell-shaped, in five deep, ovate, concave, obtuse, fringed, coriaceous segments, the two interior ones rather longest. Cor. Petals five, erect, longer than the calyx, the two uppermost rather largest, the three lower smallest; claws narrow, dilated at the base, woolly on the inside, a little bent outwards under the border; which in each petal is ovate, erect; in the larger petals hooded inwards; in the smaller expanded and bluntish. Stam. Filaments three, one between the two larger petals, two at their sides, connected below with their claws, all thread-shaped, longer than the corolla, woolly at the inside; anthers roundish, erect, directed inwards. Pist. Germen superior, turbinate, downy; style thread-shaped,

villous, the length of the stamens; stigmas three, revolute. Peric. and Seeds unknown.

Eff. Ch. Calyx bell-shaped, in five deep segments. Petals five, unequal. Stigmas three, revolute.

Obf. Schreber doubted whether his plant were the same with Aublet's, because the latter describes the corolla as monopetalous, and the three long stamens as accompanied by two short ones besides. This last circumstance may be accidental; the corolla seems more material. The flowers however are so minute, that Schreber, having seen them in a dried state only, might easily be mistaken. As he is the author of the name *Robria*, we prefer his description, as Aublet's plant, if different, must have another generic appellation.

1. R. *petioliflora*. Willd. n. 1. (Tapura guianensis; Aubl. Guian. v. 1. 126. t. 48?)—The plant of Aublet was found in forests, near the Serpent mountain, in Guiana, flowering in August. It is a shrub, 12 feet, or more, in height, with many flexible, roundish, smooth branches. Leaves alternate, on short thick stalks, elliptic-lanceolate, pointed, entire, smooth and shining, about four inches long; paler beneath. Of stipulas we can perceive no traces in Aublet's specimen, except a slight intrafoliaceous abrupt border. Flowers yellow, small, five, seven, or more together, on very short stalks, springing from the summit of each footstalk, at the base of the leaf.

We presume Schreber received his specimens from von Rohr; and as they agreed with Aublet's in the very remarkable mode of inflorescence, and must have come from the same country, there can be little reason to suspect any real difference.

ROI des Violons, or king of the fiddlers, in France. Each profession, or incorporated company, had formerly a superior, who was dignified with the title of king. The masons, carpenters, barbers, lawyers' clerks, cross-bow-men, the principal soldiers called *ribauds*, even the poets, and many other orders of men, had their particular kings; but their exactions and tyranny, by degrees, occasioned the abolition of these phantoms of sovereignty.

The minstrels, religious observers of ancient usages, were the last to relinquish this precious relic of antiquity. The king at arms, and king of the minstrels, were the only surviving monarchs of their calling. But the first has few tributaries, and his functions are only exercised occasionally; the other, on the contrary, was always in power, and pretended to exercise his empire over the whole realm.

The history of the first kings of the minstrels is unknown; it is only recorded that, after the decease of Constantine, the famous violin of the 17th century, the crown passed, in 1630, to Dummoir I., then to Dummoir II., who relinquished the crown by a voluntary abdication, occasioned by an anarchy, in 1685. Louis XIV. saw with indifference the extinction of this royalty, and declared that it was not his intention it should be restored.

This monarchy had been long agitated by internal troubles, and civil and foreign wars. The dancing-masters, originally incorporated with this company, had been 50 years soliciting its extinction; indignant at being united with such vile artizans, who dishonoured their faculty by playing at ale-houses (cabarets) and places of debauchery; or if not totally silenced, that one of the strings of their fiddles should be cut off, and they reduced to their ancient level, and be allowed to play on no instrument but the three-fringed rebec.

They had commenced a suit against the city dancing-masters, and obtained a solemn sentence against them, January 14th, 1667. No company was ever more discordant,

more tumultuous; all the courts of justice rang with their divisions and quarrels, by which the law was enriched, and the public amused, at their expence. The interregnum lasted from 1685 to 1741, when the celebrated Guignon, the violinist, was ambitious of having the royalty revived in his favour. The king had the goodness to comply with his request, and honoured him with the mintrel crown, on the 15th of June the same year. But his election awakening a desire to revive certain prerogatives, which he pretended to be inherent in his crown, he had suits and actions to defend against a host of musicians, particularly the organists, who obtained a complete victory; and Guignon, willing to give a proof of his love for the arts and disinterestedness, generously, and voluntarily, resigned his sovereignty of king of the mintrels.

ROIDALK, in *Geography*, a town of Norway; 48 miles N.N.E. of Stavanger.

ROIHA. See **OURFA**.

ROIOC, in *Botany*, a barbarous South American, or perhaps Spanish, name, for one of Plumier's genera, rightly referred by other botanists to **MORINDA**; see that article.

ROISELLE, in *Geography*, a town of France, in the department of the Somme, and chief place of a canton, in the district of Péronne; six miles E.N.E. of Péronne. The place contains 1122, and the canton 14,428 inhabitants, on a territory of 190 kilometres, in 23 communes.

ROKEJICA, in *Botany*, an Arabic name, inadmissible in systematic language, applied by Forskall, Fl. Ægypt-Arab. 90, and adopted by Jussieu, Gen. 313, for a supposed genus of the natural order of *Portulacæ*, found in sandy waste ground about Cairo. Jussieu supposes it akin to *Trianthema*. The capsule however is said to have only one cell, and there is a corolla of five petals. We know not that those who have seen Forskall's specimens, have thrown any light on this subject.

ROKETNITZ, a town of Bohemia, in the circle of Koniggratz; seven miles N. of Geyersberg.

ROKHAGE. See **AROKHAGE**.

ROKIT, CAPE, a cape on the N. coast of Africa, at the entrance into the straits of Babelmandeb; 60 miles W. of cape Guardafai.

ROKITNO, a town of Lithuania, in the palatinate of Brzesk; 72 miles E.S.E. of Pinsk.

ROKITZANY, a town of Bohemia, in the circle of Pilsen; eight miles E. of Pilsen.

ROKOL, an isle, or rather large rock, which, according to M. Kerguelen, is situated in N. lat. 57° 50', and long. 16° W. of Paris; or about 5° S.W. of St. Kilda.

ROKOSNIA, a town of Poland, in the palatinate of Braclaw, on the Bog; 16 miles W.N.W. of Braclaw.

ROLAND, DE LA PLATIERE, J. M., in *Biography*, born at Villafranche, near Lyons, of a family distinguished in the profession of the law. He was the youngest of five brothers, left orphans and without fortune. To avoid entering into the church, like his elder brothers, he left home at the age of nineteen, alone, without money, or friends; he traversed a part of France on foot, and arrived at Nantes, intending to embark for India. He was, however, dissuaded from this project, by a merchant who had seen him throw up blood, and who was aware that the climate of the East would infallibly kill him. He accordingly went to Rouen, engaged in the direction of some manufactories; distinguished himself there by his love of study, and his taste for economical and commercial pursuits; and obtained the place of inspector-general at Amiens, and then at Lyons. Having travelled in Italy, Switzerland, and other countries, he accumulated a great mass of valuable information, particu-

larly in what related to the arts, which, on his return, gained him admission into a great number of learned societies. Early in the revolution he became a member of the municipality of Lyons, and founded there a club, which he connected with the Jacobin club of Paris. In 1790 he went to the capital, took a decided share with the popular party, and in March 1792, was raised to the administration of the interior. He seems now to have possessed an enthusiastic love and attachment to a republican form of government. The first day that he appeared before the king, he went with straight undressed hair, a black coat, and shoes without buckles; his behaviour was, at the same time, so very uncourtly, that his majesty dismissed him a very short time before he himself was reduced to scenes of adversity and the most poignant distress. From this time Roland attached himself more than ever to the Jacobins, and was probably deeply implicated in the business of the 20th of June and 10th of August of that same year. He deprecated, however, the cruelties of the 2d of September, and denounced the horrors that were transacting under the mask of patriotism. As the violent gained ascendancy, Roland was declining in credit. On the 20th of January 1793, he, as member of the provisional executive council, signed the order for the execution of the king: this was one of his last official acts: yielding to the voice of the Mountain faction he resigned, and was involved in the proscription which issued against the Brissotines; but he contrived to escape from Paris, and conceal himself among his friends at Rouen: as soon, however, as he heard of his wife's execution, he determined not to survive her. He stabbed himself near the high road, leaving a paper containing the following lines; "whoever you may be that find me lying here, respect my remains; they are those of a man who devoted his whole life to being useful, and who died, as he lived, virtuous and honest." Roland was kind and obliging to his friends, but the irascibility of his temper made him many enemies. He was deeply read in the learned, and in several modern languages, and was author of the following works: "An Essay on the Rearing of Flocks and the Improvement of Wool;" "The Art of the Woollen-Cloth Printer, of the Cotton-Velvet Maker," &c. This work forms the Compendium of Mechanical Arts, published by the Academy of Sciences. "Letters written from Switzerland, Italy, Sicily, and Malta, in 1782." A new edition of this work was published in 1800. They are addressed to a lady whom he soon after married, and are filled with useful views and interesting accounts of the manufactories of various countries. See the next article.

ROLAND, MARIE-JEANNE PHILEPON, wife of the preceding, was born at Paris in 1754. She was the daughter of an eminent engraver, who, though highly distinguished in his profession, had brought himself to ruin by extravagance and dissipation. The daughter, brought up in the midst of the fine arts, surrounded by books, pictures, and music, became learned and skilled in music and painting. Though not what might be called regularly handsome, her person was attractive, and her character excited general admiration in the circle in which she moved. Her mother dying while she was young, she was obliged, owing to the ruined fortunes of her father, to seek an asylum in a convent. Here she lived in honourable solitude, submitting cheerfully to the privations which were found necessary in her reduced situation, while she took every means to improve her mind by study. In 1780, Roland addressed to her, as we have seen, his letters on Italy, and offered her his hand. She accepted the offer, and when married they went to Amiens, where she studied botany, and made an herbarium of the plants of Picardy. She afterwards, in 1787, visited Switzerland

and England, and was led, from what she observed in the constitutions of those countries, to study the theory of government, the result of which was an ardent attachment to the principles of liberty. M. Roland having been appointed inspector of the manufactories at Lyons, was deputed to the constituent assembly, to obtain from it succours necessary for the payment of the debt of that town. Madame Roland at this period settled with her husband in the capital, and took delight in receiving at her house the chief of the popular party, and the most distinguished deputies of the Gironde, that is, of the Brissotine party. Brissot, Barbaroux, Louret, Claviere, and Vergniaud, were admitted there; she not only infused ardour into their political deliberations, but is supposed, in many cases, to have been something more than secretary, inditing as well as writing their most celebrated papers: for a time, she was the secret power that directed the whole government of France. In the month of March 1792, when the king found it necessary, in order to allay the public discontents, to nominate a popular administration, Roland was appointed minister of the interior: the principal part of his labours was generally attributed to madame Roland; so much so, that when he resigned, and was urgently pressed by the assembly to resume his functions, Danton exclaimed, "if we give an invitation to Roland, we must give one to his wife too. I know all the virtues of the minister, but we want men who see otherwise than by their wives." According to the memoirs which she wrote of herself, she was in fact the minister without the name: she revised, or perhaps dictated, the letter which Roland addressed to the king on going out of office; "if he had written sermons," said she, "I should have done the same." On the 7th of December 1792, having appeared at the bar of the national convention, to repel a denunciation made against her, she spoke with ease and eloquence, and was afterwards admitted to the honours of a sitting. She presented herself there again, when the decree was passed against her husband; but then, the power of eloquence having lost its charms in the ruffian breaths of the senators, she was refused a hearing, and was herself sent to the Abbaye, that dreadful bourn, from whose gate few passed but to a mock-trial and savage execution. From this abode of misery she wrote to the assembly, and to the minister of the interior; her section also demanded for her liberty, but it was in vain; and on the 24th of June 1793, she was sent to the convent of St. Pélagie, which had been converted into a prison, where she passed her time in consoling her fellow prisoners, and composing an account of her own life, and of the transactions of which she had been the eye-witness, and in many of which she had been an actor. At length she was called before the revolutionary tribunal, and underwent an examination with calmness and serenity, disturbed only when one of the ermined savages put to her questions offensive to her modesty. On the 8th of November she was condemned to death for having conspired against the unity and indivisibility of the republic. Her execution immediately followed. On passing the statue of liberty, in the Place de la Revolution, she bent her head towards it, exclaiming, "O Liberty, how many crimes are perpetrated in thy name." Madame Roland was a woman capable of inspiring all the elevated sentiments that she felt; with the grace and animation of one sex, she possessed the firmness and solidity of the other; and she was generally admitted to be superior to all the men of the party with whom her husband acted. She particularly excelled in the penetration and knowledge of the human character. She left one daughter, whose only provision was her mother's writings, which are as follow: "Opuscules," on moral topics, which treat of the soul, melancholy, mo-

rality, old age, friendship, love, retirement, &c.; "Voyage en Angleterre et en Suisse;" and when in prison she composed what she entitled, "Appel à l'impartiale Postérité," containing historical notices, anecdotes, and her own private memoirs. This work presents many well-drawn characters of that period, with the purest sentiments of public and private morality. Her own memoirs are extremely valuable, as giving a picture of life and manners in the middle ranks of life in France, with a view of the progress of a mind which was unquestionably one of the highest order with respect to virtue and intellect. Biog. Moderne, 3 vols. 1814. Biographical Anec. of the Fr. Revol.

ROLAND, or ORLANDO, the poetical hero of Boiardo, Berni, and Ariosto, and nephew of Charlemagne, celebrated in some ancient military songs; for an account of which, see CHANSON. One of these begins with the following verse:

"Let ev'ry valiant son of Gaul
Sing Roland's deeds, her greatest glory,
Whose name will stoutest foes appal,
And feats inspire for future glory."

See Burney's Hist. of Music, vol. ii. p. 277.

ROLANDINO, an early Italian historian, was the son of a notary at Padua, in which city he was born, in the year 1200. He studied at Bologna, and in 1220 received the honorary title of master and doctor in grammar and rhetoric. He had kept a chronicle of memorable events as they occurred, and put his papers into his son's hands after he returned from Bologna, with a charge to continue them. This he executed with care and fidelity to the year 1260, when he was urged to revise and complete his work. He employed two years in this revision; and in 1262, his chronicle, in twelve books, in the Latin language, was read publicly before the university of Padua, submitted to an attentive examination, and solemnly approved. Rolandino died in 1276. His history is accounted one of the most exact and faithful records of that time. Though his style is not free from barbarisms, his narrative is clear and well arranged. Vossius affirms, that he surpassed all the writers of his age in perspicuity, order, and judgment, and that he shewed himself well versed in sacred and profane literature. An edition of his work, with other chronicles, was given at Venice in 1636, by Felix Ofius, and it has been reprinted by Muratori, in the 7th volume of his Italian historians.

ROLANDRA, in Botany, serves to commemorate Daniel Rolandra, a pupil of Linnæus, who visited Surinam, and communicated an account of the *Doliocarpus* to the Academy of Stockholm, which appeared in the 17th volume of the Transactions of that learned body, published in 1756. Several of his papers on Entomology are to be found in the same collection. He was almost the only naturalist, educated by Linnæus, whose character disappointed the hopes of his preceptor; but he is said to have been still more unfortunate, than negligent or ungrateful. We know no particulars of his history. The name was given by Rottböll, in the Collectanea of the Medical Society at Copenhagen, v. 2. 256.—Schreb. Gen. 593. Willd. Sp. Pl. v. 3. 2400. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 186. Swartz Prodr. 116. Ind. Occ. v. 3. 1388. (See Juss. 176.)—Class and order, *Syngenesia Polygamia-segregata*. Nat. Ord. *Compositæ capitatæ*, Linn. *Cinarcephalæ*, Juss.

Gen. Ch. *Common Calyx* none. Florets clustered into a roundish head, the clusters distinct, stalked, separated by numerous, ovate or lanceolate, awned scales, shorter than the florets. Partial perianth chaffy, of two unequal, compressed,

pressed, keeled valves; the upper one largest, awned, enclosing the other, which is pointed. *Cor.* of each floret very minute, of one petal, funnel-shaped; tube long, thread-shaped; limb in five very short, erect, acute segments. *Stam.* Filaments in each floret, five, shorter than the tube; anthers united into a cylinder, below the throat. *Pist.* Germen, in each floret, triangular, compressed, acute at the base, abrupt at the summit; style the length of the tube, divided at the top; stigma tumid, erect. *Peric.* none, the seed being enclosed in the unchanged partial calyx. *Seed* triangular, crowned with a toothed border.

Ess. Ch. Common Calyx none. Perianth of two valves, single-flowered. Florets all perfect. Seed with a toothed crown.

Obf. Rottböll describes the corolla of each floret as four-cleft; Swartz found it always five-cleft, with five filaments.

1. *R. argentea.* Silver-leaved Rolandra. Swartz Ind. Occ. v. 3. 1389. Willd. n. 1. Ait. n. 1. (Echinops fruticosus; Linn. Sp. Pl. ed. 1. 815? Amaranthoides fruticosum, foliis longis, angustis, subtus niveis; Sloane Jam. v. 1. 43. t. 7. f. 3.)—Native of Jamaica, Cayenne, and Surinam. Cultivated in Chelsea garden, before the year 1714, and said to flower in the stove in July. We have never met with the living plant. The stem is shrubby, erect, branched, round, reddish; the young branches whitish and downy. Leaves stalked, alternate, ovato-lanceolate, minutely serrated, about two inches long, ribbed; green and shining, but roughish to the touch, on the upper side; snow-white and downy beneath. There are usually axillary tufts of a few much smaller leaves. Flowers in small, round, sessile, solitary, axillary, whitish heads.—Plumier's Echinops, t. 125. f. 1, which Linnæus adopted from him under the name of *fruticosus*, without seeing a specimen, but afterwards rejected, bears too little resemblance to Sloane's plant to be considered, with any probability, as the same.

ROLAS, in *Geography*, a small island in the Atlantic, near the S.W. coast of the island of St. Thomas.

ROLDUC, a town of France, in the department of the Lower Meuse, and chief place of a canton, in the district of Maëtricht; called, in the language of the country, "Hertogenrode," formerly well fortified, but greatly demolished by wars, and the capital of a county, which contained a great number of villages; 10 miles S.W. of Juliers. The place contains 940, and the canton 11,196 inhabitants, on a territory of 100 kilometres, in 12 communes. N. lat. 50° 52'. E. long. 6° 5'.

ROLE, a town of Bengal; 25 miles S.S.E. of Palamow.

ROLEPARA, a town of Hindoostan, in Orissa; 25 miles S.E. of Boad.

ROLI., in the *Manufactories*, something wound and folded up in a cylindrical form.

Few stuffs are made in rolls, except fattins, gauzes, and crapes, which are apt to break, and take plaits not easy to be got out, if folded otherwise. Ribbands, however, and laces, galloons, and paduas of all kinds, are thus rolled.

The ancients made all their books up in form of rolls, or little columns; and, in Cicero's time, the libraries consisted wholly of those rolls. The dearth of parchment, and the cheapness of papyrus, of which the rolls were made, was the reason that scarcely any but paper rolls were used.

Vossius says, they pasted several sheets end to end, when filled on one side, and rolled them up together, beginning with the last, which they called *umbilicus*, and to which they fastened an ivory or boxen stick, to sustain the roll.

To the other extremity they pasted a piece of parchment, to cover and preserve it.

These rolls were placed in the libraries perpendicularly to the horizon. The Jews still preserve the ancient usage of rolls for the books they read in the synagogues.

ROLL, *To*, in *Military Language*, is to continue one uniform beat of the drum, without variations, for a certain length of time. When a line is advancing in full front, or in echellons, for any considerable distance, the music of one regulating battalion may, at intervals, be permitted to play for a few seconds at a time, and the drums of the other battalions may be allowed occasionally to roll: drums likewise roll when troops are advancing to charge. For the method of performing the roll, see *Roll*, under *DRUM*.

ROLL, *Long*, a beat of drum by which troops are assembled at any particular spot of rendezvous or parade.

ROLL, *Short*. See *Ruffe* under *DRUM*.

ROLL of *Tobacco*, is tobacco in the leaf, twisted in the mill, and wound twill over twill, about a stick or roller.

The generality of tobacco in America is there sold in rolls of various weights; and it is not till after its arrival in England, Spain, France, and Holland that it is cut. Roll tobacco is what is chiefly used, both for chewing and rasping. See *TOBACCO*.

ROLL of *Parchment* contains 20 skins.

ROLL, *Rotulus*, in *Law*, denotes a schedule of paper or parchment, which may be wound up by the hand into the fashion of a pipe.

Of these there are, in the Exchequer, several kinds; viz. the great *wardrobe-roll*, the *cofferer's-roll*, the *subsidy-roll*, &c.

The word is formed from the French *rolle*, of the Latin *rotulus*; because most instruments and expeditions in law were anciently written on papers, or parchments, sewed or glued together, and thus rolled up: whence the word *enrol*, and the like.

ROLLS of *Parliament*, are the manuscript registers of the proceedings of our ancient parliaments.

Before the use of printing, and till the reign of Henry VII. our statutes were all engrossed in parchment, and (by virtue of the king's writ for that purpose) proclaimed openly in every county.

In these rolls we have also a great many decisions of difficult points in law, which were frequently, in former times, referred to the decision of that high court.

ROLL, *Rider*, a schedule, or small piece of parchment, frequently sewed, or added to some part of a roll, or record.

Noy observes, that the court ex-officio may award a certiorari ad informandam conscientiam; and that which is certified shall be annexed to the record, and called a *rider-roll*.

ROLL is also used for a list of the names of several persons of the same condition, or entered in the same engagement.

ROLL, *Court*. See *COURT-Roll*.

ROLL, *Muster*. See *MUSTER-Roll*.

ROLL, *Size*, a list containing the names of all the men belonging to a troop or company, with the height or stature of each specifically marked. Every serjeant keeps a regular *size-roll*, and every captain of a troop or company ought to have one likewise.

ROLL, *Squad*, a list containing the names of each particular squad. Every non-commissioned officer and corporal, who are entrusted with the care and arrangement of a squad, must have a roll of this kind.

ROLL-*Calling*, is the calling over of the soldiers of a troop, or company, by their names, to see that they are all present.

and England, and was led, from what she observed in the constitutions of those countries, to study the theory of government, the result of which was an ardent attachment to the principles of liberty. M. Roland having been appointed inspector of the manufactories at Lyons, was deputed to the constituent assembly, to obtain from it succours necessary for the payment of the debt of that town. Madame Roland at this period settled with her husband in the capital, and took delight in receiving at her house the chief of the popular party, and the most distinguished deputies of the Gironde, that is, of the Brissotine party. Brissot, Barbaroux, Louret, Claviere, and Vergniaud, were admitted there; she not only infused ardour into their political deliberations, but is supposed, in many cases, to have been something more than secretary, inditing as well as writing their most celebrated papers: for a time, she was the secret power that directed the whole government of France. In the month of March 1792, when the king found it necessary, in order to allay the public discontents, to nominate a popular administration, Roland was appointed minister of the interior: the principal part of his labours was generally attributed to madame Roland; so much so, that when he resigned, and was urgently pressed by the assembly to resume his functions, Danton exclaimed, "if we give an invitation to Roland, we must give one to his wife too. I know all the virtues of the minister, but we want men who see otherwise than by their wives." According to the memoirs which she wrote of herself, she was in fact the minister without the name: she revised, or perhaps dictated, the letter which Roland addressed to the king on going out of office; "if he had written sermons," said she, "I should have done the same." On the 7th of December 1792, having appeared at the bar of the national convention, to repel a denunciation made against her, she spoke with ease and eloquence, and was afterwards admitted to the honours of a sitting. She presented herself there again, when the decree was passed against her husband; but then, the power of eloquence having lost its charms in the ruffian breasts of the senators, she was refused a hearing, and was herself sent to the Abbaye, that dreadful bourn, from whose gate few passed but to a mock-trial and savage execution. From this abode of misery she wrote to the assembly, and to the minister of the interior; her section also demanded for her liberty, but it was in vain; and on the 24th of June 1793, she was sent to the convent of St. Pélagie, which had been converted into a prison, where she passed her time in consoling her fellow prisoners, and composing an account of her own life, and of the transactions of which she had been the eye-witness, and in many of which she had been an actor. At length she was called before the revolutionary tribunal, and underwent an examination with calmness and serenity, disturbed only when one of the ermined savages put to her questions offensive to her modesty. On the 8th of November she was condemned to death for having conspired against the unity and indivisibility of the republic. Her execution immediately followed. On passing the statue of liberty, in the Place de la Revolution, she bent her head towards it, exclaiming, "O Liberty, how many crimes are perpetrated in thy name." Madame Roland was a woman capable of inspiring all the elevated sentiments that she felt; with the grace and animation of one sex, she possessed the firmness and solidity of the other; and she was generally admitted to be superior to all the men of the party with whom her husband acted. She particularly excelled in the penetration and knowledge of the human character. She left one daughter, whose only provision was her mother's writings, which are as follow: "Opuscules," on moral topics, which treat of the soul, melancholy, mo-

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And feats inspire for future glory."

See Burney's Hist. of Music, vol. ii. p. 277.

ROLANDINO, an early Italian historian, was the son of a notary at Padua, in which city he was born, in the year 1200. He studied at Bologna, and in 1220 received the honorary title of master and doctor in grammar and rhetoric. He had kept a chronicle of memorable events as they occurred, and put his papers into his son's hands after he returned from Bologna, with a charge to continue them. This he executed with care and fidelity to the year 1260, when he was urged to revise and complete his work. He employed two years in this revision; and in 1262, his chronicle, in twelve books, in the Latin language, was read publicly before the university of Padua, submitted to an attentive examination, and solemnly approved. Rolandino died in 1276. His history is accounted one of the most exact and faithful records of that time. Though his style is not free from barbarisms, his narrative is clear and well arranged. Vossius affirms, that he surpassed all the writers of his age in perspicuity, order, and judgment, and that he shewed himself well versed in sacred and profane literature. An edition of his work, with other chronicles, was given at Venice in 1636, by Felix Osius, and it has been reprinted by Muratori, in the 7th volume of his Italian historians.

ROLANDRA, in *Botany*, serves to commemorate Daniel Rolandra, a pupil of Linnæus, who visited Surinam, and communicated an account of the *Dolioscarpus* to the Academy of Stockholm, which appeared in the 17th volume of the Transactions of that learned body, published in 1756. Several of his papers on Entomology are to be found in the same collection. He was almost the only naturalist, educated by Linnæus, whose character disappointed the hopes of his preceptor; but he is said to have been still more unfortunate, than negligent or ungrateful. We know no particulars of his history. The name was given by Rothöhl, in the Collectanea of the Medical Society at Copenhagen, v. 2. 256.—Schreb. Gen. 593. Willd. Sp. Pl. v. 3. 2400. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 186. Swartz Prodr. 116. Ind. Occ. v. 3. 1388. (See Juss. 176.)—Class and order, *Syngenesia Polygamia-segregata*. Nat. Ord. *Compositæ capitata*, Linn. *Cinarosephale*, Juss.

Gen. Ch. *Common Calyx* none. Florets clustered into a roundish head, the clusters distinct, stalked, separated by numerous, ovate or lanceolate, awned scales, shorter than the florets. Partial perianth chaffy, of two unequal, com-

pressed, keeled valves; the upper one largell, awned, enclosing the other, which is pointed. *Cor.* of each floret very minute, of one petal, funnel-shaped; tube long, thread-shaped; limb in five very short, erect, acute segments. *Stam.* Filaments in each floret, five, shorter than the tube; anthers united into a cylinder, below the throat. *Pist.* Germen, in each floret, triangular, compressed, acute at the base, abrupt at the summit; style the length of the tube, divided at the top; stigmas tumid, erect. *Peric.* none, the seed being enclosed in the unchanged partial calyx. *Seed* triangular, crowned with a toothed border.

Eff. Ch. Common Calyx none. Perianth of two valves, single-flowered. Florets all perfect. Seed with a toothed crown.

Obf. Rottböll describes the corolla of each floret as four-cleft; Swartz found it always five-cleft, with five lamens.

1. *R. argentea.* Silver-leaved Rolandra. Swartz Ind. Occ. v. 3. 1389. Willd. n. 1. Ait. n. 1. (*Echinops fruticosus*; Linn. Sp. Pl. ed. 1. 815? *Amaranthoides fruticosum, foliis longis, angustis, subtis niveis*; Sloane Jam. v. 1. 43. t. 7. f. 3.)—Native of Jamaica, Cayenne, and Surinam. Cultivated in Chelsea garden, before the year 1714, and said to flower in the stove in July. We have never met with the living plant. The *stem* is shrubby, erect, branched, round, reddish; the young branches whitish and downy. *Leaves* stalked, alternate, ovato-lanceolate, minutely serrated, about two inches long, ribbed; green and shining, but roughish to the touch, on the upper side; snow-white and downy beneath. There are usually axillary tufts, of a few much smaller leaves. *Flowers* in small, round, sessile, solitary, axillary, whitish heads.—Plumier's *Echinops*, t. 125. f. 1, which Linnæus adopted from him under the name of *fruticosus*, without seeing a specimen, but afterwards rejected, bears too little resemblance to Sloane's plant to be considered, with any probability, as the same.

ROLAS, in *Geography*, a small island in the Atlantic, near the S.W. coast of the island of St. Thomas.

ROLDUC, a town of France, in the department of the Lower Meuse, and chief place of a canton, in the district of Maestricht; called, in the language of the country, "Her-togenrode," formerly well fortified, but greatly demolished by wars, and the capital of a county, which contained a great number of villages; 10 miles S.W. of Juliers. The place contains 940, and the canton 11,196 inhabitants, on a territory of 100 kilometres, in 12 communes. N. lat. 50° 52'. E. long. 6° 5'.

ROLE, a town of Bengal; 25 miles S.S.E. of Palamow.

ROLEPARA, a town of Hindoostan, in Orissa; 25 miles S.E. of Boad.

ROLL, in the *Manuscripts*, something wound and folded up in a cylindrical form.

Few stuffs are made in rolls, except fattins, gauzes, and crapes, which are apt to break, and take plaits not easy to be got out, if folded otherwise. Ribbands, however, and laces, galloons, and paduas of all kinds, are thus rolled.

The ancients made all their books up in form of rolls, or little columns; and, in Cicero's time, the libraries consisted wholly of those rolls. The dearth of parchment, and the cheapness of papyrus, of which the rolls were made, was the reason that scarcely any but paper rolls were used.

Vossius says, they pasted several sheets end to end, when filled on one side, and rolled them up together, beginning with the last, which they called *umbilicus*, and to which they fastened an ivory or boxen stick, to sustain the roll.

To the other extremity they pasted a piece of parchment, to cover and preserve it.

These rolls were placed in the libraries perpendicularly to the horizon. The Jews still preserve the ancient usage of rolls for the books they read in the synagogues.

ROLL, *To*, in *Military Language*, is to continue one uniform beat of the drum, without variations, for a certain length of time. When a line is advancing in full front, or in echellons, for any considerable distance, the music of one regulating battalion may, at intervals, be permitted to play for a few seconds at a time, and the drums of the other battalions may be allowed occasionally to roll: drums likewise roll when troops are advancing to charge. For the method of performing the roll, see *Roll*, under *DRUM*.

ROLL, *Long*, a beat of drum by which troops are assembled at any particular spot of rendezvous or parade.

ROLL, *Short*. See *Ruffle* under *DRUM*.

ROLL of *Tobacco*, is tobacco in the leaf, twisted in the mill, and wound twill over twill, about a stick or roller.

The generality of tobacco in America is there sold in rolls of various weights; and it is not till after its arrival in England, Spain, France, and Holland that it is cut. Roll tobacco is what is chiefly used, both for chewing and rasping. See *TOBACCO*.

ROLL of *Parchment* contains 20 skins.

ROLL, *Rotulus*, in *Law*, denotes a schedule of paper or parchment, which may be wound up by the hand into the fashion of a pipe.

Of these there are, in the Exchequer, several kinds; viz. the great *wardrobe-roll*, the *cofferer's-roll*, the *subsidy-roll*, &c.

The word is formed from the French *rolle*, of the Latin *rotulus*; because most instruments and expeditions in law were anciently written on papers, or parchments, sewed or glued together, and thus rolled up: whence the word *enrol*, and the like.

ROLLS of *Parliament*, are the manuscript registers of the proceedings of our ancient parliaments.

Before the use of printing, and till the reign of Henry VII. our statutes were all engrossed in parchment, and (by virtue of the king's writ for that purpose) proclaimed openly in every county.

In these rolls we have also a great many decisions of difficult points in law, which were frequently, in former times, referred to the decision of that high court.

ROLL, *Rider*, a schedule, or small piece of parchment, frequently sewed, or added to some part of a roll, or record.

Noy observes, that the court *ex-officio* may award a certiorari ad informandam conscientiam; and that which is certified shall be annexed to the record, and called a *rider-roll*.

ROLL is also used for a list of the names of several persons of the same condition, or entered in the same engagement.

ROLL, *Court*. See *COURT-Roll*.

ROLL, *Musters*. See *MUSTER-Roll*.

ROLL, *Size*, a list containing the names of all the men belonging to a troop or company, with the height or stature of each specifically marked. Every serjeant keeps a regular *size-roll*, and every captain of a troop or company ought to have one likewise.

ROLL, *Squad*, a list containing the names of each particular squad. Every non-commissioned officer and corporal, who are entrusted with the care and arrangement of a squad, must have a roll of this kind.

ROLL-*Calling*, is the calling over of the soldiers of a troop, or company, by their names, to see that they are all present.

This necessary duty is performed by the sergeants of companies, morning and evening, in every well-regulated corps. Hence we have "morning roll-call," and "evening roll-call," on critical occasions; and in services that require promptitude and exertion, frequent roll-calls should be made.

ROLL, *Calves-head*, is a roll in the two Temples, in which every bench is taxed yearly at 2s., every barrister at 1s. 6d., and every gentleman under the bar at 1s. to the cook, and other officers of the house, in consideration of a dinner of calves-heads, provided in Easter term.

ROLL, *Ragman's*, or *Ragimund's Roll*, is a roll denominated from *Ragimund*, a papal legate in Scotland; who, calling before him all the people who held benefices in that kingdom, caused them, upon oath, to give in the value of their estates, according to which they were taxed in the court of Rome.

ROLLS, or *Office of Rolls*, in Chancery-lane, London, is an office appointed for the custody of the rolls and records in chancery.

The master of this office is the second person in that court; and, in the absence of the lord chancellor, he sits as judge. See *MASTER of the Rolls*.

This house, or office, was anciently called *Domus Converterforum*, as being appointed, by king Henry III., for the use of converted Jews; but their irregularities occasioned king Edward II. to expel them thence: upon which, the place was deputed for the custody of the rolls.

ROLLS, *Clerk of the*. See *CLERK of the Rolls*.

ROLLS, or *Roul*, among *Military Men*. See *ROUL*.

ROLL, *Bead*. See *BEAD-Roll*.

ROLL, *Check*. See *CHECK-Roll*.

ROLL, *Counter*. See *COUNTER-Roll*.

ROLL, in *Antiquity*. From the time of Anastasius, we find in the hands of the emperors, on medals, a kind of narrow long roll, or sachel, the meaning of which was greatly puzzled the antiquaries.

Some imagine it to be a roll or bundle of papers, memoirs, petitions, &c. presented occasionally to princes, consuls, and the like. Others take it to be a plaited handkerchief, which the persons who presided at the games cast forth as a signal for their beginning. Others will have it a bag of dust and ashes, presented the emperor at the ceremony of his coronation, and called *akakia*, *q. d.* a means of preserving innocence, by the remembrance of dust, &c.

ROLL, or *Roller*, is also a piece of wood, of a cylindrical form, used in the construction of several machines, and in several works and manufactures; though sometimes under other names.

It is on such rolls, properly called *beams*, that the woollen, silken, and other threads are wound, of which the weaver's works consist. For which end, each loom has usually two, and that of the gauze-weavers three.

In the glass manufacture, they have a running-roll, being a thick cylinder of cast brass, serving to conduct the melted glass to the end of the table, on which large looking-glasses are to be cast.

The founders also use a roller to work the sand which they use in making their moulds.

The presses called calenders, as serving to calender stuffs, consist, among other essential parts, of two rollers.

It is also between two rollers that the waves are given to silks, mohairs, and other stuffs proper to be tabbed.

Prints, or impressions, from copper-plates, are also taken by passing the plate and the paper between two rollers. See *Rolling-press* PRINTING, and *COPPER-Plate Work*.

ROLLS, in *Coining*, are two iron instruments, of a cylindrical figure, which serve to draw or stretch out the plates

of gold, silver, and other metals, of which the planks or pieces are to be formed for the species.

ROLLS, in *Printing*, are two large cylinders or barrels of wood fastened in the middle of what they call the cradle or gallows of the press; and which, by means of a cord or girt passing over each, and a handle which gives motion to one of them, draw the carriage of the press backwards and forwards. See *PRINTING*.

ROLLS, in the *Sugar-Works*, are two large iron barrels, which serve to bruise the canes, and express the juice. They are cast hollow, and their cavities are filled up with wood, the cylinders of which are properly the rollers.

ROLLS, or *Rollers*, among *Carpenters*, *Masons*, &c. are plain cylinders of wood, seven or eight inches in diameter, and three or four feet long; used for the removing of beams, huge stones, and other like burdens, which are cumbersome, but not exceedingly heavy.

These rollers are placed, successively, under the fore-part of the masses to be removed; which, at the same time, are pushed forward by levers, &c. applied behind.

ROLLS, *Endless*. When blocks of marble, or other excessive heavy loads, are to be removed, they use what they call *endless* rolls.

These, to give them the greater force, and prevent their bursting, are made of wood joined together by cross-quarters; they are about double the length and thickness of the common roller, and, besides, are girt with several large iron hoops at each end. At a foot's distance from the ends are four mortises, or rather only two, but pierced through and through, into which are put the ends of long levers which the workmen draw by ropes fastened to the ends, still changing the mortise, as the roll has made a quarter of a turn.

ROLL-*rich Stones*, in *Antiquity*, a series of huge stones, ranged in a circle, near Morton in the Marsh, in Oxfordshire. There are many fabulous traditions about them. Among the antiquaries, some take them to be a monument of a victory; others, a burying place; and others, a place for the coronation of the Danish kings.

Near Penros, in Cornwall, is a like monument.

ROLLAND, in *Geography*, an island in the South Indian sea, discovered by Kerguelen in the year 1773, so called by him after the name of the vessel in which he sailed; about nine miles in circuit. N. lat. 48° 37'. E. long. 68° 43'.

ROLLE, MICHAEL, in *Biography*, a French mathematician, was born at Ambert, a small town in Auvergne, in the year 1652. His father was in rather low circumstances, and placed him to gain his livelihood, at first with a notary, and afterwards with different country attorneys. Disgusted with an occupation so little suited to his genius, at the age of 23 he went to Paris, depending for his support on his penmanship. At first he taught writing and the early rules of arithmetic: from arithmetic he advanced by gradual steps to algebra, to which he became so enthusiastically attached, that he spent every leisure moment in the study till he became distinguished in that branch of science. In 1682, the learned Ozanam having proposed a difficult mathematical problem to exercise the ingenuity of mathematicians, M. Rolle sent him a very clear solution of it, together with methods which he had invented of solving other problems, attended with still greater difficulty. The minister Colbert, always the patron of talent, having heard of Rolle, determined to draw him out of the obscurity in which he had hitherto been concealed, and settled on him a pension. He now gave up the occupation of a writing master, and devoted himself entirely to the study of algebra, and the other

other branches of pure mathematics; and so great was his success, that in 1685, three years only after his name was first known in the mathematical world, he was chosen a member of the Academy of Sciences. In the year 1690, M. Rolle published a treatise on Algebra, which was followed by a new work, entitled "A Demonstration of a Method for the Resolution of Equations of all degrees;" to which succeeded two other methods; by the first of which the same equations are resolved geometrically; and by the second, several unresolved questions of Diophantus are answered. In the year 1699 he published a work, entitled "A Method of resolving indeterminate Questions in Algebra," and he was appointed second geometrical-pensionary of the Academy of Sciences. About this time he united with that party in the Academy which opposed the new geometry, and carried on a controversy against the marquis de l'Hôpital, on the subject of infinitesimals, till the society imposed silence on all the disputants. M. Rolle thought that his favourite science, algebra, was capable of almost indefinite improvement, and he announced his design of drawing up entirely new elements, but death put an end to his plans. He died in 1719, in the 68th year of his age, having uniformly borne an excellent character for piety, probity, and amiable manners. Besides the works already mentioned, many curious papers were communicated by him to the Academy of Sciences, and may be found in their "Memoirs," from the year in which he took his seat in that body till 1714. The higher branches of the mathematics are the subjects of almost all these papers.

ROLLE, JOHANN HEINRICH, the youngest of three brothers, all eminent musicians, and sons of a father who, as music director at Magdeburg, had rendered the name illustrious. Henry, who succeeded his father as music-director in his native city, was born in 1718, and died in 1785. He was an excellent composer for the church, as well as author of pieces for the organ and harpsichord of great merit. His oratorio of "Thiría and her Sons," is full of good taste, new passages, pleasing effects, and true pathos.

ROLLE, Fr. a part in *Music and Dramatic Works*. The French have a distinct term in music for a vocal and instrumental part in an opera or concert. The singer's or the actor's part in an opera or play, is equally termed *rolle*; in a concert or opera each instrumental part is called *partie*. We make no distinction, in England, between a vocal or instrumental part in an opera or concert: each is called part: as the part of Hamlet, in a play, of Mandane, in an opera; the first violin, tenor, or violoncello part needs no other distinction than the name of the character, or instrument.

ROLLE, in *Geography*, a town of Switzerland, and capital of a lordship, situated on the N.W. side of the lake of Geneva; 14 miles S.W. of Laufanne.

ROLLER. See ROLL.

ROLLER, in *Gunnery*, a round piece of wood of about nine inches diameter, and four feet long, which serves in moving mortars from one place to another, when near. This is done by raising the fore-part of the bed so high that a roller may be laid under it; then pushing the bed forwards, and laying another in its way, and another before that, and so on, the mortar is easily moved.

ROLLER is also a small wheel placed at the foot of the hammer of a gun, or pistol-lock, in order to lessen the friction of it against the hammer or feather-spring.

ROLLER, in *Agriculture*, a well-known implement formed of wood, cast-iron, or stone, so as to turn upon its axis, and be drawn over the surface of the land by means of horses, for the purpose of reducing the lumpy or cloddy

state of tillage lands, and rendering these, as well as those of the grass kind, smooth and even. They are constructed in different ways for different purposes, and of different sizes and weights to suit different uses in husbandry. They are, however, in general distinguished into the tillage and grass kind. It has been a matter of dispute, whether rollers with large or small diameters have the advantage, in point of effect upon the land. It is probable that there may be inconveniences in both extremes. The roller should not, however, be so small as to require much loading, as by such means much time and labour are lost. A late practical writer, however, advises that in constructing heavy rollers, the workmen should be careful that they have not too great a diameter, whatever the material be of which they are formed, as the pressure is diminished where the implement is of very large size, by its resting on too much surface at once, except an addition of weight in proportion be made. By having the roller made small, when loaded to the same weight, a much greater effect will be produced, and a considerable saving of expence be made in the construction of the implement. And he recommends that all the larger sorts of rollers should have double shafts, in order that they may be drawn by two horses abreast; and such as are employed for arable lands should have a scraper attached to them. This addition, he thinks, saves much time, and prevents the driver the trouble of constantly scraping the machine, especially in wet seasons, and clayey tenacious lands. Strong frames are also necessary for rollers, so that proper weights may be put upon them; and open boxes or carts placed upon them may sometimes be requisite, in order to contain any additional weight that may be thought proper, as well as to receive stones or other matters that may be picked up from the ground. Pieces of wood or stone, as heavy as a man can lift, are the most suitable substances for loading these implements with, where they have not the advantage of boxes for the purpose of containing such weighty substances.

There has been much inconvenience experienced in the use of this sort of implement in turning at the ends of ridges, fields, or other places, from their not moving upon their axes, but being drawn along the surface of the ground, by which they are liable to tear it up, and make deep holes and depressions before they come again into the direct line of draught, and are not brought round without great exertion in the teams: it has therefore been attempted, in order to obviate these inconveniences, to construct rollers in two pieces, and by the division in the middle to enable the different parts to twist round on their proper axes, one forward and the other in a retrograde direction. When formed in this way, the cylinders are best made of cast-iron, as they turn with greater ease and readiness.

ROLLER, *Common*. This is a sort of roller which is employed for the common purposes of tillage, and which is mostly used for rolling wheat in the spring, and grass-seeds; they are generally about five or six feet long, and from fifteen to thirty inches in diameter; but those employed for flattening one-bout ridges, in order to prepare them for drilling turnips upon, are commonly shorter and of much less diameter, and frequently attached to the drilling implement.

But of the various kinds of these rollers that are made use of, Mr. Morley of Newark thinks that those of the best construction, and which answer the most perfectly in practice, are such as are made of cast-iron, and divided into two parts: the length from three feet to three feet six inches, covering a surface of from six to seven feet, and being above ten hundred weight: the frame should be made

in a stout manner, with shafts for one horse, to be fixed on the near side, and hooks put in on the other side in order to have recourse to an additional horse when it may be necessary. The gudgeons or pivots should act upon small case-hardened friction-wheels, two to be fixed upon each side the frame; with a small roller made of hard wood, about nine inches long and three inches in diameter, bound at each end with iron, and to be fixed to the back part of the frame, so that both rollers may act with each other in the centre wheel, which will be a means of keeping the great roller steady, and at the same time very much diminish the draught of the implement.

And it is observed in the Agricultural Report of Norfolk, that Mr. Priest of Beshorpe uses a roller that is divided in two parts, rising and falling in the centre, for the purpose of rolling the slopes of ridges. And that the same useful tool is in practice in Suffolk by the Rev. Mr. Hill.

In Dengey and Rochford hundreds, in the county of Essex, where the wire-worm has long been so very destructive to the grain crops, an extremely heavy stone roller is a common implement on every farm; they are made six or seven feet long, and eighteen inches, and some more, in diameter, weighing from one and a half to two tons.

In Devonshire they use heavy granite and moor-stone rollers with two horses, which are from five to eight feet in length, and of proportionate diameters, for rolling wheat and pasture grounds, as well as for aiding the operation of separating the spine from the mould on the burn-beat-lands, in preparation for the former crop and turnips.

In many other districts heavy stone rollers, of the free-stone and other kinds, are preferred to all other sorts for tillage uses.

ROLLER, Compound. This is an implement of the roller kind, constituted of the plane or common and spike kinds united in the same frame; but it is capable of being used separately, and its weight varied according to the nature or circumstances of the land. It is the ingenious invention of Mr. Amos of Lincolnshire, in which the spike part of the roller is made of a piece of oak wood, seven feet long, and fifteen inches and a quarter in diameter, hooped with iron at each end. The inventor advises in constructing it to divide the circumference of this roller into twelve equal parts, from which to draw parallel lines, one division oblique the whole length of the roller. On the first of these lines to set off two inches at each end, and divide the remainder into twenty equal parts, of four inches each. On the second line to set off four inches at each end, and divide the remainder into nineteen equal parts; and so of all the other lines alternately. In every division to fix an iron spike, so that there will be twenty spikes in one row, and nineteen in the other, throughout the whole circumference, making in all two hundred and thirty-four spikes. That part of the spike which projects out of the wood is four inches long, one inch square at the circumference of the roller, and three-quarters of an inch square at the point. The tongue, which goes into the wood, is four inches long, seven-eighths of an inch square at the circumference of the roller, and tapers to a point at the end. The plain roller is made of a piece of oak wood, seven feet long and eighteen inches diameter. In the centre of each end of both rollers are fixed iron bushes of two inches diameter. The bow part of the left-hand side of the frame is made of iron, four inches broad, half an inch thick, and is a segment of a circle twenty-seven and a half inches radius, fixed for turning the roller upside down. The string part of the bow is five feet two inches long, and eight by three inches square, made of oak wood. In these pieces are fixed gudgeons of two inches diameter, on which

the rollers move, and at four feet one and a half inch asunder. The four shafts are eleven feet long, six by three and a half inches square at the hinder ends, through which the centre-bolt passes. There are four bars four by one and a half inches square, and three and a half feet long, for bracing the shafts together. And two bars eight feet long, and three by eight inches square, with double tenons at each end, for bracing the outside frames together. In the outer ends of these tenons are linchpins for the convenience of taking the machine to pieces. The centre-bolt is made of hammered iron, two and a quarter inches diameter; at one end is a round head, at the other a linchpin. The principal use of this bolt is to give the uppermost roller inclination forward when working, and the degree of inclination is governed by the breadth of, and the distance between the two braces, which rest upon the shafts when the roller is at work, so as to make the horses carry a little weight on their backs, otherwise it would be in danger of endeavouring to fall backward. The distance between them is twelve or six inches from the centre-bolt. This implement is found of vast use in reducing the stubborn sorts of soil to a fine state of mould, or what is termed tilth by farmers. The ingenious inventor remarks, that it affords the farmer a command over dry seasons, and enables him to sow his spring and fallow crops in proper time. It likewise, he thinks, furnishes him with the means of cleaning his tillage lands from weeds, whether of the root or seed kind. After passing this sort of roller two or three times over the land, with drag harrowing in the intervals, he supposes it would be rendered sufficiently fine for any purpose that it may be wanted for. And that when the cloddy surface is reduced to such a condition as to be incapable of being longer acted upon by the spike roller, the plane roller may be had recourse to with the dry harrow. It is likewise stated to be of great advantage in restoring such grass-lands as have the sward in a degenerated state. See ROLLING.

ROLLER, Concave. The bellying or furrow-rollers have been in common use some length of time, in most tillage parts of the country; but the concave ones have perhaps never yet been met with, except about Bradwell, in the county of Essex. They are there made the smallest in the middle, swelling out to a large circumference at each end. The whole of the farmers thereabouts highly approve of this kind of roller, having very generally adopted it. It is made of such lengths as to suit the differences of the ridges or stitches, which are made use of in cultivating the ground. And it has a scraper attached to it, for taking away the cloggy mould that hangs upon it. The most usual length of the roller part is seven feet two inches; to the extremities or outsides of the frame, seven feet nine inches; the length of the ends of the frame, four feet three inches; the diameter of the roller at the ends, one foot ten inches; in the concave part in the middle, one foot four inches; the circumference in the same place, four feet. A representation of it may be seen in the first volume of the Agricultural Report of Essex.

ROLLER, Drill. This is a roller originally contrived for the purpose of forming drills in dry light soils, for putting the grain in; but which is likewise found useful in reducing cloddy rough tillage land into a state of pulverization and fineness. The invention of it has by some been ascribed to the Norfolk farmers; but the writer of the Agricultural Survey of that district says, that he has at different periods made many inquiries for the inventor of this tool, but could not ascertain it thirteen years ago. Mr. Sillis, of Hartford Bridge, near Norwich, was mentioned to him as a person who had improved it. It is described as a cylinder of iron, about

about seven feet in length, around which are fixed cutting wheels of cast-iron, that each turn independently of the others around the common cylinder, weighing from a ton to a ton and a half, being drawn by four horses, and is heavy work. It is observed, that the cutting wheels, being moveable, may be fixed by washers at any distance, commonly at four inches. By passing over a fresh ploughed layer, the soil is cut into little channels, four inches asunder; the seed is then sown broad-cast, and the land bush-harrowed in the direction of the drills: thus the seed is deposited at an equal depth. George, earl of Orford, gave the writer one, but the soil was too heavy for it: for breaking clods in a dry season, no tool he ever beheld comes near to it. It is supposed by some, that the main object of the practice is to save the trouble and expence of dibbling, though it is not near so good a practice.

And it is remarked by the author of the above Agricultural Report, that they are much in use in Lodden hundred. Mr. Burton, of Langley, puts in a great deal of corn thus, and approves the method so much, that hitherto he has drilled little; but thinks dibbling a vast improvement. It is, however, added, that the implement was more commonly used in the county ten or twelve years ago than it is at present; for the drill machine has been adopted by many, who formerly had a good opinion of this tool. It must, however, be found beneficial in its original intention, in many cases, on the very light friable soils; and as a pulverizing machine on those of the heavy kind, when used in suitable seasons.

ROLLER, Furrow. This is a tool of the roller kind, contrived for the purpose of rolling the furrows in steep hilly situations, and other places where the common sort cannot be employed. It is the invention of Mr. Pinchard, and is an useful contrivance for the purpose for which it was intended.

ROLLER, Grass. This is a heavy sort of roller, made use of for the purpose of rendering the surface of grass-lands smooth and even. It has been suggested, that the wooden rollers of this sort, which are frequently employed with great propriety on grass and pasture lands, are in many cases made too large to produce that powerful effect which is wanted, without the aid of additional weight being given. If made less, and well loaded, it is supposed that a greater degree of pressure will be afforded. A medium size is probably the most effectual in giving the requisite pressure in such cases. A powerful implement of this sort, which is used in the best grass district of the kingdom, weighs something less than half a ton. It is, however, made of wood; but iron or stone, where they can be had, are much better materials. It is stated in the Norfolk Agricultural Report, that Mr. Coke has the most powerful roller for grass-land that the writer has seen; it was cast at the Carron foundery. It is five feet six inches high, and five feet six inches long; weighs three and a half tons; is drawn by four horses, and cost sixty pounds. It is observed, that it leaves the surface of grass-lands in the order that it ought always to be in.

ROLLER, Jointed, such a one as is made with a joint or joints, in order to conform to the nature of the ridges. These kinds of rollers are constructed by some farmers in the county of Essex. Mr. Tweed has invented one, which he finds of very great use. He rolls all his clover-land for drilling wheat with it, and employs it for whatever sort of tillage-rolling is to be performed. The great object of it is to prevent the horses from poaching, by their going only in the furrow, two of them at length.

ROLLER, Spike. This sort of roller is constructed much

in the same way as those of the common kind, only instead of being plain, it is fludded or set with a considerable number of spikes, by which it is supposed to break the soil more effectually. It is mostly employed on the heavy, stiff, lumpy tillage lands, for the purpose of reducing and bringing these into a better state of pulverization. In some cases it may be a good implement: it may be connected with the compound roller. When the drill-roller is in use, this sort of roller is unnecessary.

ROLLER, in Gardening, a very useful implement in many different intentions, and for several different purposes. The kinds which are most commonly employed in this way are those of stone and cast-iron, for compressing the more hard surfaces; and those of the smaller wood sort, for removing worm-casts and other protuberances on short grass-lawns, and other descriptions of pleasure-grounds, in the state of turf or sward. They are never required to be of any great weight for these uses, but to be capable of being readily managed by the labourer without difficulty or inconvenience.

No unusual peculiarity of form is here ever necessary, as the main object is constantly that of rendering the surfaces, over which they may pass, as smooth and even as possible.

Moderate or middle-sized common cast-iron rollers are now most usually made use of, for the purposes of gardening.

ROLLER, in Inland Navigation, a term applied to an inclined plane, with rollers on it.

ROLLER, in Ornithology, the common name of a bird of the mag-pie kind, called *garrulus argentoratenfis* by authors, and suspected to be the same with the bird described by Gesner, under the name of the *blue crow, cornix cerulea*, and by Aldrovand under the name of *pica marina*. It is the *CORACIAS Garrula* of Linnæus; which see.

ROLLER is also the name by which some call the *ampelis*, or *garrulus Bobemicus*. This, in the Linnæan system, is a species of the *ampelis*. See **GARRULUS**.

ROLLER, in Block-making, a cylindrical pin turning on its own axis, which is used in some blocks, instead of a sheave.

ROLLERS, Cylindrical, pieces of timber, revolving on an iron axis, and so fixed above the deck, either perpendicularly or horizontally, as to prevent the chafing of the messenger or cable against the jeer and top-sail-sheet bits, &c. Those fixed forward in the manger are to facilitate the messenger to the capstan.

ROLLERS, Friction, are made of two parallel circular plates of brass, about a quarter of an inch thick. Four or more solid brass cylinders are placed at equal distances round these plates, and work upon their own axes, between them, at right angles. Thus any pin working through these plates of brass must touch the rolling surfaces of the solid brass cylinders, by which the friction is considerably lessened.

ROLLER, in Surgery, a long and broad ligature, usually of linen cloth, used for binding, furring, and containing, the parts of the human body, and keeping them in, or disposing them, to a state of health.

A roller consists of two parts; the *body*, and the two extremities, which some call *heads* or *chiefs*, and others *tails*. There are single-headed rollers, that is, such as are rolled at one head only, double-headed rollers, &c.

Again: some are equally rolled and gathered together; as those applied to fractures and dislocated joints. Others are cut into several chiefs or heads; as those for the head, chin, &c. Others are composed of several swaths, gathered and stitched together; as those for the testicles, &c. Some again

again are broad; as those for the breast, belly, &c. Others narrow; as those for lips, fingers, &c.

Guidon directs the roller for the shoulder to be six fingers broad; that for the thigh, five; for the leg, four; for the arm, three; and the finger, one. See *BANDAGE*.

ROLLFELD, in *Geography*, a town of Germany, on the Maine; 2 miles S. of Clingenberg.

ROLLI, PAOLO, in *Biography*, a Roman poet, born in 1687, the son of an architect. He was a disciple of the celebrated Gravina, who inspired him with the love of poetry and literature. The earl of Burlington having brought him to England, which he commemorates in the dedication of his opera of "Astarte" to his noble patron, who attached him to the court as master of the Tuscan language to the princesses.

Rolli did not spend an inactive life in England; for, besides being opera poet to the Royal Academy of Music till it was broke up, teaching his language to the royal family, and many of the first nobility, he published Italian odes, songs, elegies, endeca syllaba in the manner of Catullus, which were much admired. Besides these he published epigrams, and fine editions in London of the Satires of Ariosto, the complete works of Berni, Varchi, &c. 2 vols. 8vo. much esteemed; the Decamerone of Boccaccio, the Lucretius of Marchetti, Odes of Anacreon, and a translation of Milton's Paradise Lost, in Italian verse, folio.

Upon the death of queen Caroline, his royal protectress, in 1737, he left England, and returned into Italy, where he died in 1767, leaving behind him a very curious cabinet, and a rich library of well-chosen books.

ROLLIN, CHARLES, an eloquent writer and professor, was born at Paris in 1661. He was intended for the same trade as that of his father, namely, a cutler; but a Benedictine, who had watched the opening of his mind, and clearly perceived in him a genius for learning, procured for him an exhibition at the college of Pleffis; and he was immediately taken under the protection of the principal, M. Charles Gobinet. He went through, with much applause, a course of classics and philosophy; and then studied theology for three years at the Sorbonne. A way seemed now open to him in the college of Pleffis, and in 1683 Rollin entered that seat of learning. In 1687 he was made professor of rhetoric, and in 1688 he obtained the chair of eloquence in the Royal College. He became rector in 1694, and occupied that post two years. During his administration, he revived the study of the Greek, substituted academical exercises for the representation of tragedies, and introduced the custom of obliging the scholars to get the holy scriptures by heart. In 1698 he was appointed coadjutor of the college of Beauvais, an office which he held till 1712. In the year 1720 he was again rector of the university; after which he entirely devoted himself to the composition of the works for which his name is particularly celebrated, and of which the following is an enumeration of the principal: "Traité de la Manière d'enseigner et d'étudier les Belles Lettres par Rapport, à l'Esprit et au Cœur," 4 vols. 12mo., published at different times between the years 1726-8, with a supplement relative to the studies of children, and the education of females. Several editions of this work have been published. "L'Histoire Ancienne des Egyptiens, des Carthaginois, des Allyriens, des Babyloniens," &c. 13 vols. 12mo., published between 1730-38. Voltaire speaks in terms of high respect of this work: while he admits that the latter volumes are not written with so much care as the earlier ones, yet he says it is the best historical compilation in any language; because the compilers of such works are seldom eloquent, which Rollin always was. It has been

thought, and with probability, that Rollin wrote history chiefly for the opportunity of throwing into the narrative abundance of useful reflections. He paid too much credit to the exaggerations of the ancient historians, and is in a good measure void of that critical sagacity, which should be characteristic of the writer of history. This quality could scarcely be expected from the man who gave implicit creed to the miracles, as they were called, of the abbé de Paris, and who was accustomed to pray kneeling before his tomb. The other principal work of Rollin was "Histoire Romaine depuis la Fondation de Rome jusqu'à la Bataille d'Actium," 8 vols. 12mo. This was continued by Crevier to the reign of Constantine. Rollin died with a character universally esteemed, at the age of 80, in the year 1741. His writings have been popular both in France and in other countries. Voltaire says, that he was the first member of the university who wrote with purity and dignity. He began with establishing his reputation as a classical scholar, by a number of Latin harangues and poems, which have been printed; and by an edition of Quintilian, intended for the use of schools, which he illustrated with short notes, and a preface. This edition of Quintilian has been several times reprinted, in 2 vols. 12mo.; that in our possession was published at Paris in 1774.

ROLLING, ROTATION, in *Mechanics*, a kind of circular motion, in which the moveable turns round its own axis, or centre, and continually applies new parts of its surface to the body it moves upon.

Such is that of a wheel, a sphere, or the like. Such, particularly, are the motions of the earth, the planets, &c.

The motion of rolling is opposed to that of *sliding*; in which the same surface is continually applied to the plane it moves along.

It must be noted, that in a wheel it is only the circumference that properly rolls; the rest proceeds in a compound angular kind of motion, and partly rolls, partly slides. The not distinguishing between which two, occasioned the difficulty of that celebrated problem, the *rota Aristotelica*, *Aristotle's wheel*.

The friction of a body in rolling, or the resistance made to it by the roughness of the plane it moves on, is found to be much less than the friction in sliding.

Hence, the great use of wheels, rolls, &c. in machines; as much of the action as possible being laid thereon, to make the resistance the lesser.

For the laws of bodies rolling on inclined planes, see *Inclined PLANE* and *DESCENT*. See also *ROTATION*.

ROLLING, in *Gardening*, the work of rendering any surface level by means of the roller. It is practised equally for the purpose of bringing the surfaces of the gravel and other kinds of hard walks and roads into an exact and even order, as well as those of pleasure-grounds, which are in the condition of short or mown grass. And it is sometimes applicable in other intentions, as those of rolling in particular sorts of seeds, instead of putting them in by means of treading the beds by the feet, and the rolling down and rendering more close the too loose and open grounds of gardens, &c.

The rolling down of garden-walks and roads should always be done, when possible, immediately after slight falls of rain, the gravel or other kinds of materials being previously put in suitable order by sweeping and raking with proper rakes for the purpose. The roller is then to be carefully drawn up on one side and down the other of them as close as possible to the grass verges, and afterwards along the middle parts, in a forward and backward direction, which most completely completes the work.

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In rolling and rendering short-grass pleasure-grounds smooth and even, it is usual to go over them, in the first place, when they are to be mown, as soon as possible after a good fall of rain, with a small wooden roller, in order to take up and remove the worm-casts, and then to follow with the iron one, beginning at one side and going on in a regular manner over the whole, in a close up-and-down direction. The rolling, in these cases, is sometimes also performed for the purpose of mowing only, which is always done by the wooden roller, as it clears the grass in the best manner; the iron roller being run over afterwards, when the mown grass has been removed.

Rolling should be frequently practised in cases of this nature, in order that the walks, roads, and lawns, may be kept in a neat, proper condition, and never be suffered to run into a ruinous and disorderly state.

ROLLING, in *Husbandry*, the action or operation of drawing a roller over the surface of the ground, with the view of breaking down the clods, rendering it more compact, and bringing it even and level; or for only levelling the surface, as in grass-lands. This is a practice that becomes necessary both upon the tillage and grass-lands, and which is of much utility in both sorts of husbandry. In the former case, it is made use of with different intentions, as for the purpose of breaking down and reducing the cloddy and lumpy parts of the soil in preparing it for the reception of crops. It is also of great use in many cases of light soils, in rendering the surface more firm, even, and solid, after the seed is put in. It is likewise found beneficial to the young crops in the early spring, in various instances. And it is stated by the author of *Practical Agriculture*, that in the cases of stiff, heavy, and adhesive soils of different kinds, it may frequently be made use of with the first-mentioned intention with very great advantage; but it should only be employed when such lands are tolerably dry, for when drawn over the ground under the contrary circumstances, little benefit can be afforded in the way of pulverization, while much mischief must be produced by the poaching of the horses, and the plaiting the earth round the implement. But by using it in the manner just directed, all the lumpy or cloddy parts of the surface soil may be effectually crushed and reduced into a fine powdery state, fit for the reception of the seed. And that if, in such sorts of soil, it be applied, in the intervals between the different harrowings, it may contribute much in the same way, not merely by reducing a great number of the lumps by the pressure that it causes, but by forcing others so much into the ground that they may be acted upon, and further broken down by the fermentation that mostly takes place in the soil after the land has been stirred. In all the light and more porous sorts of soil very beneficial consequences may also be derived from this operation by the consolidation of surface that is thus produced, and the more perfect retention of moisture, by which the seed, especially if of the small kind, is enabled to vegetate more equally, as well as in a more expeditious manner than would otherwise be the case. It is likewise supposed, that, in cases where lands have been left rough after ploughing, for the purpose of more effectually destroying weeds, it may be of utility, by being employed before the harrows, to give them more power in laying hold of and reducing the soil, and by the pulverization that it affords, and the more perfect retention of moisture that it causes, in consequence of the surface being rendered more close and compact, the seed-weeds are produced more abundantly, and more readily destroyed. It is likewise in these last methods, Mr. Donaldson says, that it proves so highly beneficial in all cases where grass-seeds are sown; as well as by the equality and smoothness of surface

that are thereby produced; and it is well observed by the same writer, that if no other benefit were derived from rolling lands in tillage, than smoothing the surface, even that in harvest is of material consequence, more especially where the crops are cut down with the scythe, which is general in most of the southern districts of the kingdom, and which the increasing scarcity of labourers must soon, in all probability, introduce into those of the north. It is also remarked by Mr. Morley, in the fourth volume of *Communications to the Board of Agriculture*, that old sward, or grass-seeds, upon first breaking up, should always be rolled before dibbling for either wheat, beans, or pease, as it makes the land more solid, and the grain, when it vegetates, will form a stronger root. Wheat should always be rolled in the spring after frost, as it will make the soil adhere more closely to the roots of the plants, which very much encourages vegetation, and will cause the stem to be much stronger, and the grain will be brought to greater perfection. Barley and oats should always be rolled when the blades are about an inch above the ground, if the weather permits; and turnips should be rolled at night, soon after the plants make their appearance, which will be a means of destroying a great number of slugs and snails, that are very destructive to the young plants. And it is supposed by Mr. Somerville, in his *Agricultural Survey of East Lothian*, that rolling, when conducted in a judicious manner, is highly beneficial, and admits of being much extended, especially upon all winter crops after that season has been severe, and without any regard to soils, as both loams and clays, after much naked frost, have their cohesion so much broken as to leave the plants quite loose, and almost without any establishment. It has also been stated, that the rolling of wheat, rye, barley, &c. with a roller of good length, and half the weight of the common ones above described, may be advantageous in other ways, as it presses down the soil that has been raised by the frosts about the minute ramifications of the attracting vessels or ducts, and augments the quantity of mould upon them by breaking the little lumps of sod; which, indeed, were very serviceable in winter by affording shelter, but in spring will still be of greater use, by such imminution in filling up the fissures, and preventing, in a great measure, the ill effects droughts have on light soils, by retaining and filtering rain-water; whereby the soil imbibes whatever is nutritive, and what is superfluous of the simple fluid only escapes.

But it is added, that although these are some of the many advantages rolling produces in agriculture, notwithstanding it amounts to no more than mere conjecture, that, in general, rolling corn may do more damage than it can good, if such cautions as the following be not carefully attended to; *viz.* never to roll corn but in dry fresh weather; by no means to use heavy rollers, nor to roll too early, as before the blades be pretty strong, for the wounds that the blades may receive, the roots, being then tender, will be unable ever to recover; nor too late, as, when the stalks are hardened and grown to any height, for the roller will break them, which injury can hardly be repaired, and the crop is thereby greatly hurt; that none but light lands are proper to be rolled with this view, and those which have been manured that or the preceding year with dung only: in short, none but rich, light soils, in general, can be improved by rolling in this intention; for in poor lands it opposes the most active principles, and undoes all that has been done for the crop by ploughing, &c. It is consequently concluded, that the soil, the condition, the growth of the corn, the weather, and the weight of the roller, are all to be most scrupulously regarded: when all coincide, the advantages of rolling may be great; but when they do not,

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the disadvantages may be insuperable. Rolling, then, is neither the least critical, nor the most insignificant piece of the husbandman's profession; therefore ought not to be performed at random and without circumspection, in cases where young crops are concerned.

Mr. Marshall, in his *Rural Economy of Norfolk*, in speaking of rolling, remarks, that one circumstance requires to be mentioned, which is, that the roller, notwithstanding the lightness of the foil, and its proneness to be injured by dry weather, is never used in Norfolk for the purpose of compaction. He never saw one used by a farmer either upon fallow or upon a lay; not even upon the first year of a cloverlay, to smooth the surface for the scythe. The only uses to which he has seen a roller put, in that district, are that of smoothing the surface before sowing, to prevent the seed from running down too low, and that of smoothing it afterwards as a preparation for the scythe; and even this operation is performed with a roller not more perhaps than seven or eight inches in diameter; a circumstance which he confesses he is no way able to account for; nevertheless, it would be rashness to condemn an established practice, unless he could, from his own experience, or from adequate observation on the experience of others, prove it to be ineligible. And it is stated, that there is a sort of land which, when clover is sown upon it, throws out the young plants after a frost. Rolling in the beginning of winter, and immediately after the frost is gone, will, in some measure, prevent this. The first rolling hinders the frost from penetrating so deep as it would otherwise do; and the second makes the land firm, after having been loosened by the change from frost to open weather. In the latter case, or that of grass-land, this is also a process that is of much advantage, especially where such lands are kept under the scythe. And it is probable, that in many cases of pasture lands it may be found of great benefit. In the former it is found beneficial in keeping the surface free from hills, and in a more even state, as well as the grass from becoming in so tuffocky a condition, as is often the case where the practice is neglected, or not well understood. And in the latter it may perhaps have a similar effect, and keep the grass more free from tufts, and in a more regular condition, which is a circumstance of great consequence in the practice of grazing. It has been remarked, that the impression of the roller not only renders the surface more level and fine, but at the same time induces the grass plants to spread more laterally, and in that way to form a better and more close sward, which may be highly beneficial in both cases. Its importance on new laid-down grass-lands is therefore extremely obvious, as it must be highly serviceable in these different intentions. And the worm-casts are by this means reduced and brought into order, by which means the mowing can be performed with greater facility, and in a closer manner. Besides, it may be useful in other views, as by pressing the mould, as well as the manure, more closely round the roots of the grass plants; and in consequence of such means, they may not only be better established in the soil, and their vigorous growth more effectually promoted, but, from the moisture being more fully preserved in the ground, be in less danger of injury from the effects of heat in the summer months, and of course better crops be afforded at the period of cutting them down. In order to perform this business in the most complete and effectual manner, a roller of considerable weight is necessary, such as has been already described; and it has been advised, in order to prevent as much as possible the ground from being injured by the feet of the animals that draw it, as may frequently be the case where they follow each other in the same path, it may be the best practice to

have them yoked double, as by that means there will be less treading on the same portion of the surface; and that where two horses are sufficient to execute the work, more should never be made use of; but if a third should be found necessary, it may be attached as a leader in the middle, before the other two: a greater number of horses can seldom or ever be of any material advantage in this sort of work. It is also suggested as necessary, to be very careful in executing this operation, to see that every part receives the due impression of the implement. On lands where this sort of work is regularly performed, it will seldom be requisite to pass more than once in a place, but in other cases it may often be done more frequently with benefit; and in particular cases, a more frequent repetition of the operation is absolutely requisite, in order to bring the ground into a proper state. It is necessary, in the execution of this business on grass-lands, to attend in a particular manner to the season, as it cannot be performed with advantage, either when the surface is in too dry or too moist a condition. It is stated, that in these cases the work of rolling may be advantageously performed at different seasons, as in the beginning of the autumn, and in the commencement of the year, or very early spring months; but the latter is the most common period. But in order to its being executed with the greatest possible benefit; a time should always be chosen, if possible, when the ground is in a suitable state for receiving the impression of the implement. In the drier descriptions of land it may frequently be performed in the most beneficial manner, after the land has been rendered a little soft by a moderate fall of rain; but in those of the contrary sort, it may be necessary to wait till the superabundant moisture be so much dried up, as to admit the animals employed in drawing the machine, without poaching or otherwise injuring the surface of the ground while the process is going on. It has been remarked by Mr. Boswell, that the rolling of watered meadows should be executed towards the latter end of February or beginning of the following month, after the land has been left in a dry state for a week or ten days. And that the work should be performed lengthwise of the panses, going up one side of the trenches, and down the other. And in the case of rolling the common hay lands, it is a good mode to proceed up one side the field, and down the other, somewhat in a similar manner, as by that means the work may be the most completely executed, and with the least trouble.

Also a writer, in the *Communications to the Board of Agriculture*, mentioned above, has remarked, that sward and meadow land should always be rolled in April or the beginning of May, and when the ground is in a moist state, as it causes the grass to be of a more kind nature, and reduces the hills raised by the ants to a proper state of being mown over.

Likewise on such new grass-lands as have been just restored to the state of sward, and which are often thin and patchy, when seeds are sown over such parts, the roller may frequently be run over them in order to force in the seeds; but a better practice is to turn sheep upon the lands, confining them upon such patches by means of hurdles, in order that they may tread them in. In either case, a rather moist time should be chosen for the purpose. In cases of this nature, where there is a degenerate sward, Mr. Amos, in his *Minutes on Agriculture*, advises the use of his compound roller, which should be run over the ground early in March, when the sward will admit the spikes without being injured by the feet of the horses, the land being previously covered with well-rotted dung, or compost, in the proportion of from about eight or ten tons to the acre. It should be well rolled in
different

different directions, till the surface sward is pretty much broken, then sowing the grass-seed over the land, and after letting it be well dressed with the sward-dresser, and all the rubbish collected cleared away, rolling it well down with the plain roller, and admitting no sort of live-stock afterwards upon it. In this method of using the roller, vast improvements may, in many cases of degenerated or worn-out grass-lands, be effected, without incurring any very heavy expences, or much trouble. See *SWARD-Dresser*.

ROLLING-Bridge signifies, among *Canal-Makers*, an *INCLINED Plane*; which see.

ROLLING-Carts. See *CARTS*.

ROLLING-Mill, in *Metallurgy*, and particularly in the *Iron Manufacture*, is a mill for reducing masses of iron or other metals into even parallel bars, or flat thin plates: this is effected by passing the metal, whilst red-hot, between two cylindrical rollers of iron or steel, which are put in motion by the power of the mill; and being so mounted in a strong metal frame, that they cannot recede from each other, they compress the metal which is passed between them, and reduce it to a thickness equal to the space between their surfaces.

It requires a most enormous power to put in motion the rollers which are employed for laminating iron in the large way; and for this reason, the greatest number of rolling-mills are situated upon the banks of rivers which have the advantage of a sufficient fall to turn the machinery. Of late years, the improvements of steam-engines have been carried to such a high perfection, as to put them on a par with water, for most purposes, and particularly for rolling-mills, as the waste heat of the furnaces used for heating the metal may be employed, in part, to raise steam for the engines which turn the rollers.

Rolling-mills were not very generally used in the iron manufacture till within these sixty years. The old mills which were first used are extremely simple; two separate water-wheels are placed on the opposite sides of the mill, with their axles in the same direction, but at different heights, so that one wheel can be connected with the upper, and the other with the lower roller: it therefore requires the two wheels to have the water delivered at opposite sides, to make them revolve in different directions, in order that the upper surface of the lower roller, and the under surface of the upper roller, may move in the same direction, and pass the iron between them. The construction of the rollers generally used in such mills is shewn at *figs. 3, 5, and 6, of Plate V. Iron Manufacture*, except that the two rollers, F and G, are there shewn with equal pinions, *d* and *e*, fixed upon the ends of their pivots, to compel the two to revolve equally together; whereas, in the mills with two separate wheels, no provision is made to ensure the equal motion of the two. The gudgeons, or necks, of the lower roller, G, are supported in brasses, fitted into strong carriages of iron E, E, which have holes through their ends, to receive four strong iron bolts, A A, B B; these stand perpendicular, and form the frame, to retain the rollers at the proper distance, being fitted through the carriages E with heads below, so that they cannot draw out. The upper ends of the bolts are cut with screws, upon which nuts, *a, a*, are fitted; and these being turned round by iron handles or wrenches, screw down the pieces D, D, and advance the rollers nearer together; or, by a contrary motion, increase the distance between them: *i* (*fig. 6*) is a strong iron bar, extended from one bolt, A, to the other, B, and fixed fast; it supports an iron plate, forming a kind of table before the rollers, to guide the iron through them. The rollers have square heads upon the ends of their gudgeons; and upon these squares, large cast-iron

sockets or boxes, as L, are fitted, and these, at the other ends, are fitted upon similar squares on the ends of the water-wheel axis. A little play or looseness is admitted in all these squares, because the upper roller is set at different heights, according to the thickness of the work which is to be rolled between them: this play is required to allow the rollers to move freely, when they are not exactly in the line of the water-wheel axis: it is to accommodate this circumstance that the principal care is required in constructing a rolling-mill. Our readers will gain a good idea of the best proportions of a mill, with two independent water-wheels, from the following directions for building one in Northumberland, which were given by Mr. Smeaton near 40 years ago. The two water-wheels are to be under-shot, and of different sizes, *viz.* 15 ft. 4 in. and 14 ft. 8 in., the mean diameter being 15 ft. The breadths in their float-boards are to be three feet each, the small wheel being laid lower than the other by seven inches: this, with the differences of their diameters, will make the centre of the large wheel 11 inches higher than the other. The different heights of the crowns of the falls or breasts, down which the water descends to act upon the wheels, and the positions of the water-shuttles, are to be so adjusted, that the gates or shuttles being equally drawn up by their starts, the wheels will, as near as possible, revolve in equal times, and with equal power. The rings of the water-wheels are to be made of cast iron, that their weight may act as flies: the ring of the lesser wheel is to be made six inches in thickness by six inches deep, while that of the larger is to be only five by six. The greater quantity of matter in the lesser wheel, therefore, will give it nearly the same momentum as the larger wheel.

The rings of the water-wheels are each to be formed by eight pieces or fellies, the exterior circle of the greater wheel being thirteen feet diameter, and that of the less twelve feet four inches: the length of the fellies is to be about half an inch shorter than their true length, in order to admit an oak wedge of one inch thick to be introduced into every joint after the rings are screwed together by the joint-plates of wrought iron, which unite the fellies. These plates are to lay upon the plain surface of the felly, and not to be let in as the common wooden rings of water-wheels, in order that the oak wedges may completely fill the joints at the ends of the fellies. The wheels are to have wooden arms, and it must be observed, that the mortises through each of the iron fellies, for receiving the ends of the arms of the wheels, are to be about two inches and a half in width, and that they are to be a little dove-tailed, in their length only, so that the mortises being longer on the outside of the ring, and the wood of the arm being spread into them with wedges, will produce firm ties to the centre; but as a farther security, pins are to be put in after the wedging is completed. The mortises in the rings for the starts, which support the float-boards, are to be four inches by two, without dove-tailing, or rather they should be larger outside than inside. The breast or float-boards will fix by nails into the joints and arms, where they fall; but that the breast-boards for the intermediate floats may also have a fastening, holes of about one inch diameter, and about four inches deep, must be cast in the ring, at the places for every other float; these holes, being filled up with pieces of oak, will afford places to drive the nails for securing the boards. The axles of the water-wheel are to be of cast-iron, with flaunches to screw the arms of the wheel against. The total length of each axis is to be seven feet one inch, and the diameter throughout the axis is to be a circle of nine inches. The manner of fixing the arms upon flaunches is to be found in *Plate XXXIV. Mechanics*, in our article *MILL*.

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The brasses upon which the necks of the water-wheel axles are supported, are intended to be let into cast-iron stocks, which are again supported upon wooden bed-planks, and those upon the cap-stones of the walls, which (under these at least) are supposed to reach all across the thickness of the walls, those necks being first truly and smoothly turned; at each end, beyond the neck, is formed an astragal or moulding, to keep the wheel in its place from moving endways. The ends of the axis are terminated by an indented head, shaped somewhat like a square citadel in fortification, and an iron box is fitted upon this to communicate the motion to the rollers, the surface lines of the indented head being formed a little rounding, that the box may not only be certain of taking its bearing in the middle, but likewise be capable of complying with the motion of the rollers: and in order to give still more liberty, the end of the box which is farthest from the water-wheel, is formed into a square of eight inches, which is again surrounded by another box, whose external surface is round. This box is formed at the end of a round spindle or axis three feet long, and terminated at the other end with a square of eight inches, which enters one end of a square box, and at its other end receives the square of the roller, supposed to be of six inches, but may be of any other size which is thought necessary. It is to be noted, that all the squares are to be made larger than those of the rollers, in order that they may wear longer; and all the insertions are to be less than those at the end of the water-wheel axles, that the axis may not be rendered useless by the wear or failure of the citadel heads which are introduced, as they are expected to last many years; and if any thing should happen to them, the axes are made alike on both sides of the water-wheels, that they may change ends; therefore, there is nothing of consequence likely to fail by wear or breakage, except the smaller intermediate work between the axis and the rolls, which is easily replaced. Holes are to be made through the boxes and joint parts for iron bolts to pass through rather loosely, so as to prevent the boxes and squares separating, but not to confine the joints from yielding to the motion of the rolls. The water-wheels are supposed to be closely adapted to their conduits, and their axes to remain immovable as to height, at the difference of eleven inches in level, while the rolls are supposed to vary in their diameter from twelve inches to nine. This will be allowed for, by the distance that the squares upon the rolls are from the end of the axis; for though the house is supposed no more than ten feet wide between the walls, the distance between the middle of the citadel heads at the end of the water-wheel axis, and the middle of the squares of the rolls respectively, is upwards of four feet; and in that length no less than four joints are introduced, every one of which complying a little, a small difference in the height of the roll will produce no sensible difference in the communication of the motion from that of a right line; all the joints being kept oiled or greased, which will be not less proper on that account than to keep the parts from wearing. In order to preserve the directions as near as possible to a right line, Mr. Smeaton proposes that the lower roll shall be placed originally half an inch below the centre of the axis which turns it: suppose the rolls were first made of twelve inches diameter, while the difference of the height of the axis is only eleven, the upper roll will be just half an inch too high, so that the compliance in each will be equal, and no more than half an inch in four feet length. Thus it appears, that when the rolls are reduced by wearing from twelve inches to eleven each, then the upper roll as well as the lower will be half an inch too low for its axis; still

neither will need to comply or vacillate more than half an inch. The roll being now of a just diameter to answer the different heights of the axis, let the lower roll be raised to its just height, and then both the rolls will work true till they are further reduced; but when they become reduced to ten inches and a half diameter, the upper roll will become half an inch too low; then raise the under roll half an inch above the line, and the upper roll will then be truly in the line; so that when the upper roll is come down to be half an inch below the line, the rolls will be reduced to ten inches; then raising the under roll a quarter of an inch more, it will be three quarters above the line, and the upper roll will be a quarter of an inch under the line; and when it comes down to three quarters below the line, the rolls will be reduced to nine inches and a half; therefore, lastly, raise the under roll another quarter, so as to be an inch above the line, and the upper roll will be reduced to half an inch below it, so that when it is come down to an inch below it, the rolls will be reduced to nine inches. In this way the departure of the rolls from a right line will never become more than half an inch, while they are reducing from twelve to ten inches; nor more than three quarters, while they are reducing from ten to nine and a half inches; at the worst they will be no more than an inch, while they are reducing from nine and a half to nine inches. The greatest inequality is purposely made at this place, both because the purchase of the wheels is then greatest and most able to overcome an addition of friction, and because the time that they will continue in this state is the least. If the axles are placed at ten and a half inches distance instead of eleven, the vacillation each way will never exceed three quarters of an inch; nor more than one inch to reduce the rolls to eight and a half diameter.

The raising of the under roll is not to be done by raising the whole of the bed of the roller-frame; this is to be set originally half an inch lower than the true line; and when the lower roll requires raising, it is to be effected by putting iron plates under the carriages of the lower roll gudgeons, so that they will stand as much higher than before, and not to make the several rises by additional plates, but to have plates of the different gages, so that each will lay in one solid piece.

Mills, on this construction, are still used in many iron-works for rolling coarse iron bars, but are unfit for any better purpose, from the difficulty of adjusting the two water-wheels to an equal velocity; and if one roller moves quicker than the other, the metal becomes more extended on that side than upon the other, and is thus rendered convex. Another defect is, the want of proper fly-wheels to regulate the mill; for the cast-iron rims to the water-wheels by no means answers the purpose of fly-wheels, unless they are made to revolve so quickly that the water loses much of its effect upon the floats. Fly-wheels are, perhaps, more useful for rolling than in any other kind of mills, because the resistance to be overcome is so variable; being at one moment very great for a large piece of iron, then smaller whilst it is passed through a second time, because the iron is to be less reduced: and in the interval of returning the iron, to put it through again, there is no other resistance than that of the friction of the machinery. Again, when the iron has been passed through several times, the resistance is greatest of all, because the metal has become harder, both by the compression it has undergone, and from being gradually cooled; also, the metal, being thinner, will not yield so readily to the pressure, as when in a larger mass. By the proper addition of a heavy fly-wheel, great advantages, in point of power, are gained, as it tends to

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equalize all these irregularities; and in every interval, when the resistance is removed, the water-wheel gives a rapid motion to the fly, the force of which will be returned when the work is applied: in such a mill, if the workmen have an extraordinary large piece of metal to roll, they suffer the mill to work for a few seconds without any resistance, then putting in the iron, it is carried through at once by the momentum of the fly, though requiring a power far beyond the ordinary force of the water-wheel. The most approved method of applying a fly-wheel to a rolling-mill, is to have a large cog-wheel upon the axis of the water-wheel, to give motion to a pinion, upon the axis of which a heavy iron fly-wheel is fixed: the wheel and pinion are of such a size as to make the fly revolve about three times to one of the water-wheel: at the opposite side of the great cog-wheel another pinion, of about half its size, is placed, and to the extremity of its axis produced, the rollers are connected, the two rollers being made to turn together by means of pinions upon the ends of their gudgeons, in the manner shewn at *d e*, *fig. 6. Plate V.* If more than one pair of rollers is to be worked, a cog-wheel is fixed upon the axis which turns the rollers, and works another equal wheel upon the axis of the second pair, placed parallel to the former; in this case the lengths of the two axes must be different, so that the lines in which the bars will come through the different rollers, will not interfere with each other, but leave sufficient room between for the men to work. In most common mills, rollers, such as are represented at *figs. 3, 5, 6, of Plate V.* are employed; but to these there are some objections; first, the four nuts *a, a*, cannot all be turned at once with such precision as to bring the upper roller exactly parallel to the other; the means the workmen use for this, is to have a small iron wrench, or handle, fitted upon two of the nuts, *a, a*, and these they turn round a small quantity every time the metal has passed through, in the interval whilst it is returned to be put through again. The workman who stands in front to introduce the metal between the rollers, turns the nut on his left-hand side which is nearest to him; whilst his comrade, who receives the metal, and hands it back again to him over the roller, turns the nut on the opposite corner of the frame: by this means, as only two, instead of four, of the nuts are turned, the pieces *D* are constantly put out of the horizontal position, in which alone they can take a proper bearing; also, in these frames there is no support for the weight of the upper roll; but when there is no metal beneath it, it falls down, and rests upon the other; when the metal is suddenly introduced, it lifts the roll up to its bearing with a jerk, which endangers the breaking of some of the parts, and generally causes the nuts to start a little before they settle themselves to the strain. In the modern mills, the frames for the rollers are made of cast-iron, as shewn at *figs. 1 and 2. Plate V.* The cheeks, *A*, are cast in one piece, and form a bed for the reception of the brags of the lower roller *H*; a piece, *C*, is fitted upon the top of the cast-iron cheeks, and is held down by two strong wrought-iron bolts, with nuts, *a, b*, to screw it down, and regulate the distance between the two rollers, the gudgeon of the upper roller, *G*, being confined by a brags let into the piece *C*, but to bear it up from falling: when there is no iron between the two rollers, another brags is placed beneath the gudgeon, *G*, and suspended by bolts, *d, d*, from the piece *C*; by this means the two rollers are retained always at a proper distance asunder. The two standards *A, B*, *fig. 2*, at the opposite ends of the rollers, have broad feet at bottom, by means of which they are bolted down to massive ground-fills, which extend all across the mill-house. The rollers *E* and *F* are

caused to move together equably by means of pinions *a, b*, which, that they may work well, are made with accurate teeth, of not more than $1\frac{1}{2}$ or 2 inches pitch, or distance asunder; and, to give the requisite strength, they are made of considerable breadth, as the figure shews. Two large flat iron plates, *I* and *K*, are screwed to the two standards, both to strengthen them, and to form a table, upon which the masses to be rolled are laid to be presented to the rollers, and having passed through, are received on that at the opposite side.

The rollers shewn in *figs. 1* and *2*, have a number of grooves in them, which being opposite to each other, leave openings of a determinate figure for the purpose of rolling square bars, with the angles upwards; they do not therefore require to be adjusted in distance, as other plain rollers do, but are always, after the first erection, retained at the same distance; in this case the pinions *a* and *b* serve very well to connect the motions of two rollers together; but when the rollers are required to be adjusted during the working, as in the *Plate Rollers, fig. 6*, the pinions must necessarily have very coarse and long cogs, that they may not be so much affected by increasing or diminishing the distance between their centres; in this case they work very indifferently, and frequently break by the awkward manner in which such coarse teeth always meet each other when upon wheels or pinions of small radius, particularly when the proper distance between their centres is not preserved. As a partial remedy for this difficulty, the pinions are, in some mills, made very broad, with fine teeth, and mounted in a separate frame, exactly similar, except in its strength, to that of the rollers; this is placed at a distance of three or four feet from the rollers; then a coupling, or short shaft, being interposed between the squares at the ends of the axis of the pinions, and those of the rollers, they permit the latter to be adjusted without disturbing the pinions; and the length of the shafts will accommodate for the differences between them.

In *Plate IV. of Iron Manufacture*, we have given three figures of a very capital rolling-mill in Messrs. Walker's extensive iron-works at Rotherham, in Yorkshire, where they have several mills worked by the same river. The one in question is employed in reducing iron to small rods for nail-making, by first rolling the pieces to flat bars, and then passing them through a pair of slitting rollers, which divides each into several small square rods: it is, therefore, much smaller in its dimensions than the great mills used for rolling thick iron plate; but we have selected it on account of the arrangement of its wheels, which renders it superior to the mills in common use, as it works without the pinions of which we have spoken. *A A*, in the plan, (*fig. 1.*) is the water-wheel, 17 feet diameter, and five feet six inches broad: it is of the under-shot or rather breast-kind, the water being delivered below the centre, but confined to act upon the wheel by a breast of masonry, curved to correspond with the wheel very exactly. The pivots or gudgeons, *n*, of its axis rest on bearings, supported by the walls *N*. At one end of the axis a clutch-piece, *M*, is fixed, to give motion to a second axis *k*, which, being in the same line as that of the water-wheel, may be considered as a continuation thereof. It is carried under the floor of the mill. It has two large cog-wheels, one marked *b*, and another of the same dimensions at the opposite end, which is only seen in *fig. 2*, as it is concealed in *fig. 1*, beneath the wheel *f*, which it turns. The first of these wheels, *b*, gives motion to two wheels, *a* and *c*, which are on the axes *I* and *H*, and give motion to the lower of each of the two pair of rollers, situated in the frames at *E F* and *C D*. This wheel-work is shewn in

fig.

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fig. 3. The wheel at the other end of the shaft, *k*, (see *fig. 2.*) turns the wheel *f*, situated directly above it; and this gives motion to two wheels, *e* and *g*, of the same dimensions as *a* and *c*. Their axles, *L* and *K*, are connected with the upper of each pair of the rollers. By the introduction of the wheel *f*, the small wheels, *e* and *g*, are made to revolve in a contrary direction to the wheels *a* and *c*; and, at the same time, the centres of the former are raised a sufficient height above the latter, to allow for the difference in height of the centres of the upper and lower rollers of each pair. The coupling-boxes, *L K* and *p p*, which unite the axles of the wheels to their respective rollers, have sufficient play in the joints to allow for that small deviation which takes place in separating the rollers, to adjust them to different thicknesses of the metal they are intended to roll; though these shanks should be represented longer than the limits of our plate have allowed, the space between the frames for the wheels being in reality eight feet, instead of five feet nine inches, as given in the drawing.

By this arrangement of the wheels of the mill, the contrary motions of the two rollers are communicated from the same water-wheel, without the intervention of small pinions, which, in works requiring such heavy strains as that of rolling iron, always work with difficulty and enormous friction; so that they break and wear out constantly, making great interruptions to the work. In the present instance, the wheels are all of considerable size, and, therefore, transmit the power more equably, at the same time that they give the two rollers precisely the same velocity, which is a circumstance of some importance in making good rolling for plates or bars, which will be irregular, if one roller turns faster than the other, in consequence of one side of the metal being more expanded. The framing of the mill (*Plate IV.*) is very clearly expressed by the drawing. The axles *H* and *I*, of the wheels *a* and *c*, are supported in bearings, screwed down to iron frames, which are securely fixed to the solid masonry. On the other side, the iron frame, *O O*, is erected to support the axles of the wheel *L K*, and also that of the wheel *f*, as shewn in *fig. 2.* The main axis *k*, and the wheels upon it, are carried under ground, and supported on the walls, as shewn by the plan. The roller-frames, *C D* and *E F*, (*fig. 1.*) are fixed down upon strong beams, extended across from the frame, *O*, to the frame on the opposite side. The position of one of these beams is shewn by dotted lines on the right-hand side, in *fig. 1.* The rollers, *C, D*, are exactly the same as shewn in *Plate V. figs. 3, 5, and 6*, except that the pinions, *d* and *e*, are omitted, being unnecessary, from the arrangement of the wheels, which we have described. The other rollers at *E F* are made on a very different construction, and are called slitters, because they slit or cut up a bar of iron into several small square bars, of a size proper for nail-makers, or to form hoops for barrels. These slitters consist of two strong axles, mounted in a similar frame to the other rollers; but instead of carrying plain cylindrical rollers, they have rollers composed of steel rims or edges, of the same breadth as the rods they are to slit, and leaving between them deep grooves. The two slitters, or cutters, are so placed in their frame, that the rims of one roller will enter into the grooves between the rims of the other. This will be understood by an examination of *fig. 4. Plate V.*; though the rollers there shewn are for a totally different purpose, still the manner in which the rings of one roller enter the grooves of the other is the same as the slitters: but the proportion of breadth is different, the slitters being made with grooves of half an inch, three quarters, or one inch wide, and many intermediate sizes, corresponding to the

rods to be cut; and they are not made from a solid roller, but are formed of separate circular plates of steel of the just thickness, fitted side by side upon the axis, with circular iron plates of equal thickness between them, which form the spaces; and being of a less diameter than the steel plates, or cutters, they leave deep grooves between the edges. A number of crooked guide-bars are extended across the frame, and pass through the grooves, between the cutters; but lying at the very bottom of the grooves, and not being very thick, they do not fill up the grooves, the circles of the cutters projecting through these bars, which appear like a grate, and one is applied to each roller. Those which are called the guides of the slitters are intended to prevent the iron adhering in the grooves between the rims, or cutters, when pressed down into them; for the action of the slitters is to divide the iron which is passed through them into separate pieces, by the rim of one roller (for instance, the lower) forcing one piece of the bar down into the groove of the lower roller, whilst the adjacent part is forced up, by the rim of the lower roller, into the groove of the upper: the bar is thus divided into as many rods as there are grooves in the width which it covers. The angle at which the circles of the cutters intersect each other, is that in which the edges of a pair of shears are found the most favourable for cutting; and the slitters cut upon the same principle, but with several edges at the same time.

A rolling-mill generally contains a pair of shears, of a sufficient strength to clip off the ends of the largest iron bars, to reduce them to lengths or pieces of a sufficient size for laminating into thin plates. These are made different from other kinds of shears, in the circumstance that the cutting parts, or edges, are situated between the centre pin or joint, and the part or handle where the power is applied: the latter is of great strength, and made exceeding strong in iron. The shears are fixed in a vertical position, the upper blade being firmly fixed by the framing, and the lower one, which is the long lever, is lifted up by the mill when the cut is to be made; therefore it descends when the shears are to open, and its own weight is sufficient for that purpose. The frame consists of a very large and thick iron plate, which is securely bolted down to the foundations: at one end is an upright, which has a groove through it, to receive the moving blade, and guide it; also the end of the handle of the stationary or upper blade is supported by the upper end of this upright. The joint-pin of the two blades is supported in a strong socket, or iron frame, also erected from the same large plate, which carries the upright guide at its other end. The two blades, therefore, lie side by side, and having cutters, or blades, of steel, let into the adjacent sides of the iron levers or blades, the edges of these pass by each other when the cut is made, and will thus cut any thing which is interposed between them, in the same manner as shears or scissars; and in this circumstance is their only resemblance to those instruments. The lower or moving blade, which is a long lever, rests at the extremity, upon the periphery of an elliptical wheel, or camm, (*figs. 1, and 3.*) fixed upon the axis, *I*, of the rollers, (or, in other cases, upon the shaft of the water-wheel,) in an excentric manner, so that, in turning round, it will lift up the lever, and close the shears; but when its opposite or shortest radius comes beneath the lever, it is suffered to descend, and open the blades. At this moment the workman introduces the end of the iron-bar between the blades, pushing the end of it up to a stop, which regulates the length to be cut off; then as the camm turns, it closes the blades, and cuts at once through the bar, although some of the largest are as much as three inches broad, and an inch thick.

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Rollers are usually made of cast-iron, and are very exactly turned on their surfaces, and also their necks, that they may turn truly when put in their places. The most common way of turning them is, first to mount the roller in a strong turning lathe, by holes or centre points made in its ends; then to turn the two necks truly cylindrical; and afterwards putting the roller in its proper place in the roller-frame, and placing brasses over the necks, they are held down by blocks, fitted under the pieces which retain the gudgeons of the upper roller: in this situation it is put in motion by the mill, and a bar of iron being fixed up for a rest, the surface of the roll is turned true, in the same manner as if it was in a lathe, and will be certain to be exact, being formed from the same necks on which it is afterwards to work. In casting a roller, the mould should always be placed at a considerable depth beneath the orifice where the metal is poured in, so that the pressure of a column of the fluid metal may be obtained to consolidate the casting, and render it free from those air-holes, or porous places, which will sometimes occur in metals cast without the pressure of a column. The long piece of metal which filled the aperture through which the metal ran, is left adhering to the roller, and is cut off afterwards. This is the same mode of casting that is practised for *cannon* (see that article). Case-hardened rollers must be used when it is required to have a very fair surface; *viz.* for such purposes as rolling iron to make thin plates for tinning; also the large rollers for gold or silver, such as are now used in the Royal Mint; rollers for making tin-foil, steel-plate for saws, and for many other purposes. These rollers are not hardened by a subsequent process, as in case-hardening wrought iron, but are cast in that state. This is effected by employing iron moulds: a cast-iron cylinder of three inches thick, and its diameter equal to that of the roller, is bored out with great accuracy, and fitted with ends proper to form moulds for the necks required at each end of the roller; this is buried in the sand of the foundry, and when the metal is run into it, the rapid transmission of the heat through the iron mould causes the metal which is in contact with it to cool sooner than the other parts of the mass, and renders the surface of the roller very hard. In turning a roller of this kind, the centres must be chosen so that the circumference turns as true as it will admit, and then a very small quantity being taken off, will render it perfect: this care should be taken for two reasons; first, that lefs will be required to be removed to make it true, which is a difficult operation, as only the best steel tools will cut it; also, that if the metal is unequally reduced, or more on one side than the other, the hardest part will there be cut away, and the roller will have a hard and a soft side, and soon wear out of the circular figure, and require a second turning. The lefs metal there is turned off a case-hardened roller the better it will be, because the hard part is only a case of slight thickness, and most hard at the surface.

The operation of the rolling-mill is so simple, as scarcely to require any description: the metal is heated in reverberating furnaces when it is in large masses, and for smaller pieces a kind of oven is used, in which the cokes are laid on the bottom or floor of the oven without any grate-bars, and therefore the draft of air being lefs rapid, it gives a slight, but very regular heat, which rises to a bright red, but no farther, and therefore it does not waste the iron by burning it to scales, as a greater heat and current of air will do. This oven is proper for heating plates, hoops, or small bars, to be rolled a second and third time: but for rolling large masses, a strong welding heat is requisite, that the metal may be consolidated, and all flaws or cracks securely closed. The

reverberating furnace is used for this purpose; it is made the same as an air-furnace for melting large quantities of iron, except that the floor is horizontal; indeed it is as near as possible similar to the balling furnace. (See *Plate II. Iron Manufacture.*) The furnaces are placed as near as convenient to the rollers.

The iron, being heated in the furnace to the proper degree for the purpose which is intended, is taken out by a pair of pincers, the mill put in motion by drawing the shuttle, and the iron is presented to the rollers, which are previously adjusted to the thickness of the piece which is to be passed. If this is not attended to, and the workmen attempt to reduce the iron too much at one time, there is danger of breaking some of the machinery, or of stopping the mill whilst the iron is only half passed through: this is a disagreeable accident, as it will require four or five men, with an enormous wrench applied to the nuts of the roller, to turn them back sufficiently to relieve the rollers, so forcibly are the screws pressed whilst the iron is passing through: this is indeed evinced by the circumstance of solid cast-iron rollers, of ten inches in diameter, being sometimes broken in the middle; and the necks of eight and nine inches are frequently snapped. When the iron is placed on the shelf or table before them, their motion will draw it through, and as they cannot recede from each other, because of the nuts of the bolts, the metal is reduced to the exact thickness of the space between them, increasing in length, but not at all in breadth: the iron is caught by another workman behind the rollers, and returned over the top roller to the first man, who puts it through again, first giving the handles of the nuts a small turn, to bring the rolls nearer together. In this manner it is repeatedly rolled, till it is reduced to any required length and thickness, but the breadth is not at all increased by rolling; and if it is required to increase the breadth, it is done by putting the iron obliquely through the rollers; or if a great increase is wanted, the iron is put through breadthwise two or three times, till it is extended to the length of a gauge which the workman has marked upon the table in front.

Rolling of black Plate, such as is used for making the boilers of steam-engines, tanks, or other large vessels, in wrought iron. Such plates, when large, and of considerable thickness, are rolled from the blooms, or half blooms, which are made under the forge-hammer. These blooms, which are also called slabs, are nearly the length of the intended plate; their breadth about one-half or one-third as much as their length, and of a thickness to contain as much metal as will make two, three, or four plates. These pieces, when heated to a white heat, are presented breadthwise to the rollers, and passed through several times at the same heat, until what was the breadth of the bloom, being extended two or three times as great, becomes equal to its length. The thick square plate, thus formed, is now cut up by the shears across into two or three pieces, of about the same size as the first, but in a direction which will make what was the length of the first piece to be the breadth of the second. These pieces, being heated and rolled again, become extended to the size of the required plates: the reason of thus dividing the operation is, that the rolling only extends the metal in the direction in which it moves, and not at all in breadth: by this means, the particles of iron being drawn by the sides of one another, acquire something of a fibrous texture, or an approach thereto, which is desirable in bars, rods, and hoops, but not at all in plate, as it should be equally strong in either direction; therefore, by rolling it first one way, and then the other, the grain, as far as it is produced at all, is in both directions. There is no doubt that better plate would

ROLLING-MILL.

be made, if the slabs or original pieces were cut to the proper proportions of length and breadth, and of a thickness to form only one piece; then rolling it alternately length and breadth ways every time it is passed between the rolls, and continuing this till the plate is finished, at one heat; a better grain or texture will be thus acquired, because in the former method it will be weaker one way, having something of a grain in the direction of the last rolling.

Rolling iron Plates which are to be Tinned.—These are made from the best English iron, and some of the very thinnest from foreign iron; the bars are drawn out, by the forge hammer, to five inches broad, and half an inch thick, and are cut into lengths of eleven inches by the shears; these are heated in an oven, and passed breadthways through case-hardened rolls: this is repeated till they are extended to twice the length of the intended plates: the pieces are then folded, and set on edge in the furnace till properly heated, when they are rolled double, the fold being put in first; they are thus extended to twice the length of the folded plate. Now two men, with strong tongs, tear the two leaves asunder at the fold, and fold each again separately, putting one into the other, like two sheets of paper; in this state they are heated, and rolled four thicknesses together, the next time eight, and so on, till the plate is reduced to the required thickness: in the very thinnest plate, such as is used for tagging laces, sixteen leaves are rolled together. In folding the plates, care is taken every time to put a new surface of metal outside, otherwise, those which were constantly reduced by the pressure of the adjacent leaves, would, at length, become grained on the surface; but by continually gaining new surfaces, which are smoothed by the immediate contact of the rollers, those which are laid against them are also rendered smooth. A small quantity of oil is sprinkled between the leaves, when they are first put in, and instantly spreading over the whole surface, prevents any adhesion; the plates are dressed square by the shears every time before they are folded, to remove those parts which, by projecting over the edges of the other leaves, are not so much reduced.

After being finished, dressed square, and the surface scowered, the plates are rolled, singly, between a pair of polished case-hardened rolls, without being heated; they are therefore extended but little in size, though rendered much harder, and more stiff. *Tin-foil* is rolled much in the same manner as the plates for tinning, but of course without heating.

Rolling, or Shingling Iron by Rollers.—This is a modern invention in the manufacturing of bar-iron, the rollers being substituted for the forge hammer to work the metal, in the process of rendering it malleable. This method is only used in conjunction with the *puddling* process, that is, puddling, or converting, cast-iron into a malleable state, by decarbonating it in a reverberating furnace; in this process the metal becomes divided into grains the size of mustard seeds, with a very slight cohesion, and full of interstices between the grains; it therefore requires to be stamped, or hammered, at a welding heat, into a solid mass; but rolling will also answer the purpose.

This was first discovered by the late Mr. Wilkinson, who had, in his extensive works at Broseley, in Shropshire, a pair of enormous rollers, moved by the beam of the steam-engine, not with a rotatory, but with a reciprocating motion; they were five feet diameter, near ten feet long, and weighed almost five tons each, although cast hollow, like garden rollers; sectors were fixed on the ends of the gudgeons, to turn each other, as they did not make above one-third of a revolution, and then moved back again. The circumference

of the rolls were grooved with grooves, gradually diminishing from one end to the other, in the same manner as the rollers shewn in *Plate V. fig. 1.* The mass of iron to be rolled was collected into a ball in the furnace, which was taken out, and passed through the greatest of the grooves. When it came through, a workman at the opposite side removed the ball to the next smallest groove, and by the returning motion of the rollers, it was carried back again to the front: the front workman then returned it in another groove, and so on, passing successively through the different grooves, until, by gradual consolidation, it was reduced to an imperfect bar of malleable iron. A number of these, being cut into lengths, were made up into faggots, or piles, and by a pair of rotatory rollers finished into bars. Mr. Wilkinson had a patent for this machine, but it was afterwards found that other rollers would effect the purpose better. In *fig. 1. of Plate V.* is a view of a pair taken from Mr. Samuel Smith's works, at Sheffield, Yorkshire, a gentleman who, we believe, was the first who brought them into use; the two grooves *e* and *f* are very coarse, and have teeth, that they may, more certainly, draw in the balls. The two next grooves are plain but concave, and the remainder are angular, to form square bars when the ball becomes consolidated. The use of these rollers is very similar to those we have just described, the ball of metal being taken from the furnace, and presented to the rolls. As soon as the metal comes through the rollers, a workman behind lifts it over the upper roll to the first workman, who puts it between them again: in this manner the metal is rolled ten or twelve times, being put through a smaller groove of the rollers at each time, so as to compress it in a greater degree every time, till at last it is reduced to a tolerable square bar; but the last groove *E, fig. 2,* has teeth in different parts of the groove, and at such distances from each other, that they will indent so deeply upon the angles of the bars, at every eight or ten inches of their length, as to render it easy to break them into short pieces when they come through. The pieces, thus formed, are piled four together, and put into a ball furnace, and, when heated, they are rolled into bars, by rollers shewn at *fig. 4,* which, at the first five grooves, *e, f,* are similar to the former, but the succeeding grooves, *k, k,* are made to receive the rings of the opposite roll, leaving small rectangular spaces, as is shewn by the light parts, *fig. 4,* through which the iron, being passed, is reduced to a parallel smooth bar. The successive grooves through which it is passed are each made narrower than the preceding, so as to reduce the bars to the width and thickness intended, in which state they are sent to market, or if required for the nail rods, or hoops, are cut up by the slitters. The rollers are thought to inclose the impurities in the iron, rather than expel them; but as rollers require much less power to give them motion than the hammer, it becomes worth the consideration of manufacturers to improve their construction, and render them equal in effect to the hammer. At present the rolled iron is not always so good in quality as the hammered, though this circumstance should not deter manufacturers from using it, as it is scarcely possible that a newly invented process should be at first brought to equal perfection with another which has exercised the ingenuity of manufacturers for ages past. But in the course of practice many improvements may arise, which will remain undiscovered if the process, in its present state, is neglected; even in this state the puddled iron, made with rollers, is by no means to be despised, when its price and quality are compared; it is for iron requiring the fibrous texture that this process is best adapted.

Rolling and slitting iron for nail rods or small hoops. The iron

iron which is subjected to this process is brought to the mill, *Plate IV.* before described, from the forge hammer, in bars of a size proportionate to the nail rod it is intended to make; these are cut into lengths by the shears, and heated in the furnace, then rolled repeatedly through the rollers, C, D, which are reduced every time it passes, until the bar becomes of the thickness for the square of the intended rod, half an inch for instance, and two, or two and a half, inches wide: it is, in this state, presented to the slitters E, F, and one end being introduced between the guide-bars of the slitters, is drawn in between them by the motion, and, by this means the ring of one roller presses a corresponding breadth of the hot metal into the space between the rings of the other roller; this being performed by both rollers, completely divides the bar into several rods of the same breadth with the rings of the rollers. A small leaden pipe is fixed over the cutters, and being perforated with holes, constantly lets fall a supply of cold water on the rollers, to prevent their becoming hot, and thus losing their hardness, which alone preserves their circular figure under the intense pressure they have to sustain in dividing the iron. The guide-bars are intended to force the iron rods, when cut, out of the grooves between the rings of the collar, which they would not otherwise quit, after being so forcibly pressed into them by the rings of the opposite roller. For making small hoops, the rods, as soon as they are formed, are put through the plain rolls again, and flattened into a hoop.

Rolling of Iron Hoops.—In the country these are made from iron bars, which are reduced in rollers, similar to *fig. 4.* to a size proper to produce the hoops required; these are cut into lengths, heated, and passed through the slitters, which divide them into three or four rods, which are immediately presented to the case-hardened rolls, and flattened out into a proper hoop. The mill shewn in *Plate IV.* is equally adapted for this work as for nail-rod; but for hoops, the addition of a proper fly-wheel would be an improvement, as the work is so much heavier.

In London, where a vast quantity of old hoops is to be procured, they are re-manufactured, and make the very best sort. The victualling-board alone consume many hundred tons annually for the service of the navy: the old hoops are made up into faggots, and shingled, or welded into bloom at one heat, by a forge-hammer, or in small works by rollers like *Plate V. fig. 1.* The blooms, being again heated, are rolled out into bars by the bar rollers, *fig. 4.* and these are cut into two or three lengths, according to the sizes of the intended hoops; these pieces are heated a third time, slit into rods as above described, and then formed into hoops by the case-hardened rolls. By successive improvements it has been found, that two heats are sufficient, the first for shingling and forming the bars, and the second for slitting and flattening the hoops; but in either method the grand object is by faggoting and rolling, always in the direction of the length, to gain a fibrous texture to the iron.

Old hoops have been lately made up into new at one operation; by employing a greater power and velocity, and making up a smaller quantity at once, it may be effected at a single heat, instead of two or three. For this purpose the old hoops are cut into short lengths and faggoted in piles, the rivets being first cut out and the pieces straightened, that the piles may be more close and compact: these piles are heated in the usual kind of furnace to a good welding heat, and are rolled between the shingling rollers, being passed through two or three grooves till they are properly reduced to go through the flat-grooved bar rollers: after rolling through the three grooves thereof, they are put through the flat parts, and a guide is used to direct them straight forwards, without

care or attention from the workman. The bar is then carried to the cutters, and slit into two or more rods, which are immediately and successively passed between a pair of plain, case-hardened rolls, to finish the hoops.

Vat-hoops, or others above two inches in width, do not require to be slit, but are at once carried from the bar rollers to the plain rollers, which finish them. The piles for shingling must not be made too large, or the hoops will not retain sufficient heat to be found; about 42lbs. will be a proper quantity. The mill for this manufacture must of course have great power, and the rollers should move with a sufficient velocity to enable the iron to be got through the whole process whilst sufficiently hot. The bar and shingling rollers should be placed close together in a line, and must make about 90 revolutions *per minute*; the case-hardened rollers should make 140 *per minute*, and should be placed in such relative situations as will be most convenient to convey the iron in the quickest manner from one pair to the next. A patent has been taken out by some, who pretend to the invention of the above method; but they cannot prevent other manufacturers using it, as it is no new invention, consisting only in taking more care, and using rollers with a greater velocity.

The rolling-mill is not confined to the laminating of iron, but is likewise employed very extensively for reducing brass, copper, tin, lead, as well as gold and silver, into plates and bars. The latter metals are scarcely ever reduced by any other means than rolling; as this method makes no waste, is the most expeditious, and produces better work than hammering, or any other method, particularly when an equality of thickness and an even surface are desired; such, for example, as gold or silver, which is always to receive a polish; in these cases the rollers are made of steel hardened and polished on the surface with the most scrupulous nicety, that they may produce a perfect surface on the matters which have been passed through them.

ROLLING-Press Printing. See PRINTING.

ROLLING, in *Sea Language*, that motion by which a ship vibrates from side to side. Rolling is, therefore, a sort of revolution about an imaginary axis, passing through the centre of gravity of the ship; so that the nearer the centre of gravity is to the keel, the more violent will be the roll; because the centre about which the vibrations are made is placed so low in the bottom, that the resistance made by the keel to the volume of water which it displaces in rolling, bears very little proportion to the force of the vibration above the centre of gravity, the radius of which extends as high as the mast-heads. But if the centre of gravity is placed higher above the keel, the radius of the vibration will not only be diminished, but such an additional force to oppose the motion of rolling will be communicated to that part of the ship's bottom as may contribute to diminish this movement considerably.

It may be observed, that, with respect to the formation of a ship's body, that shape which approaches nearest to a circle is the most liable to roll; as it is evident, that if this be agitated in the water, it will have nothing to restrain it; because the rolling or rotation about its centre displaces no more water than when it remains upright; and hence it becomes necessary to increase the depth of the hold, the rising of the floors, and dead or rising-wood afore and abaft. See SHIP-BUILDING.

ROLLING-Tackle. See TACKLE.

ROLLING Fork, in *Geography*, a river of Kentucky, which runs into the Ohio, N. lat. 37° 47'. W. long. 86° 18'.

ROLLO, in *Biography*, the first duke of Normandy, was

originally a chieftain or petty prince of Denmark : the king of that country having in vain endeavoured by force to subdue his small territory, lulled him into security by a treaty which he never intended to keep, and then falling perfidiously upon him, killed his brother and many of his officers, and obliged him to take refuge in Scandinavia. Rollo here collected a body of troops, whom he farther attached to his cause by a pretended vision which predicted the certainty of future success; and then he made a bold attempt upon England, in the latter end of Alfred's reign. The order introduced by that prince having completely foiled the designs of the adventurer, he directed his enterprises to France; and sailing up the Seine, committed great ravages, and obtained possession of the city of Rouen. He proved himself so formidable an enemy to Charles the Simple, at that time king of France, that he was glad to make a treaty with Rollo, by which he gave him his daughter in marriage, with that part of Neustria called Normandy, for her dower, on the condition that Rollo should do homage for his territory, and embrace the Christian religion. Rollo very readily submitted to the ceremony of baptism, in which he had Robert duke of France for his sponsor, whose name he assumed. In governing the dukedom which he had gained by his sword, the Dane shewed nothing of the barbarian. He divided the land among his followers upon the feudal tenure, established magistracies in the different districts, and took care that law and justice were exactly administered. He severely punished robbery; treated his French subjects with mildness and equity; founded bishoprics and religious houses; and acted, in all respects, like an enlightened sovereign. Such was the reputation of his government, that the country shortly recovered its population and wealth, and many of his roving countrymen settled in Normandy, and became useful and regular subjects. To him is attributed the institution of the *exchequer*; or ambulatory parliament, which, at a later period, became stationary at Rouen. He died, worn out with the cares of government, in 932, having, five years before this, abdicated his throne in favour of his son William.

ROLLO, in *Geography*, an island in the North sea, near the coast of Lapland. N. lat. $68^{\circ} 15'$.

ROLLO'S HEAD, a cape on the W. coast of the island of Dominica; three miles S. of Prince Rupert's Head.

ROLLOCK, ROBERT, in *Biography*, a learned Scotch divine, was born near Stirling in the year 1556. He studied the classics and belles-lettres under Thomas Buchanan, who has been characterised by Spotwood as learned and wise, and a strong defender of the church's rights, and who then kept a school of considerable reputation. From Buchanan's school Rollock went to the university of St. Andrew's, where he went through a course of philosophy, and, having greatly distinguished himself, he took his degree, and was made regent of his college. In 1580 the magistrates of Edinburgh obtained permission of the king, James VI., to build a college, which being accomplished, Mr. Rollock was, in 1583, chosen the principal, and first theological professor. His high character, though not thirty years of age, brought numerous students to the new university. His reputation extended to foreign countries, where he was greatly respected by the reformed churches. He died in the year 1598, when he had only reached his forty-third year. He was author of many works, among which are the following: "In selectos aliquot Psalmos Davidis Commentarius;" "In Danielem Prophetam Commentarius;" "In Epistolam fec. Sanctum Johannem Comment." He published commentaries on some of the other epistles; also "Analysis Logica in Epistolam ad Hebræos."

ROLPACH, in *Geography*, a town of Thibet, capital of a district; 150 miles N. of Fyzabad. N. lat. $29^{\circ} 21'$. E. long. $82^{\circ} 5'$.

ROLSHUGARDE, a town of Norway; 46 miles S.S.E. of Drontheim.

ROM, an island in the North sea, near the coast of North Jutland, about eight miles long and two wide. N. lat. $55^{\circ} 9'$. E. long. $8^{\circ} 31'$.

ROM, a town of France, in the department of the Vienne; 10 miles S. of Lusignan.

ROMA, an island in the East Indian sea; about 20 miles long, and from 6 to 12 broad. S. lat. $7^{\circ} 12'$. E. long. $127^{\circ} 12'$.

ROMAGNA, a late province of Italy, bounded on the N. by the Ferrarese, on the E. by the Adriatic, on the S. by the duchy of Urbino and Tuscany, and on the W. by Bologna; about 45 miles long and 30 broad. This country, which was part of the ancient Flaminia, fell, in the fifth century, under the dominion of the Ostrogoths; whose king, Theodoric, after having taken the city of Ravenna, in the year 493, made it the place of his usual residence. In the following century, the Goths, being driven out by Belisarius and Narfes, generals of the emperors of the East, Ravenna became the residence of the emperor's exarch, till the Lombards made themselves masters of it, and dispossessed the last exarch. In the year 755, Pepin, king of the Franks, having compelled Itulphus, king of the Lombards, to cede the whole exarchate, conferred it on the see of Rome. It now forms the departments of the Amone or Lamone, and the Rubicon, in the kingdom of Italy, being surrendered by the pope in 1797. See EXARCH, and RAVENNA.

ROMAGNANO, a town of Italy, in the department of the Gogna, on the Sesia; 15 miles N.N.W. of Novara.

ROMAGNE, LA, a town of France, in the department of the Mayne and Loire; 6 miles W. of Chollet.

ROMAGNE sous les Côtes, a town of France, in the department of the Meuse; 9 miles N.W. of Estain.

ROMAGNO, a town of Italy, in the Feltrin; 6 miles N.E. of Feltri.—Also, a town of the island of Sardinia; 12 miles N.N.E. of Sassari.

ROMAHIE', a town of the Arabian Irac, on the Euphrates; 100 miles S. of Bagdad. N. lat. $31^{\circ} 40'$. E. long. $44^{\circ} 15'$.

ROMAIN, in *Husbandry*, the name of a plant, cultivated in the fields, in many parts of the world, particularly in France, and called, by our farmers, *French vetches*, or *French tares*. It is an annual plant, but a very quick grower, and is extremely good food for cattle, particularly for horses: they let these creatures feed on it all the former part of the summer, and then cut it for hay in August or September. Its short continuance in the ground makes it less valuable than saint-foin and clover; but it has this advantage over them, that it will grow on poor ground.

ROMAIN, Cape, in *Geography*, a cape on the south coast of Madagascar. S. lat. $35^{\circ} 38'$. E. long. $49^{\circ} 29'$.

ROMAIN, St., a town of France, in the department of the Charente; 3 miles N.W. of Aubeterre.—Also, a town of France, in the department of the Lower Seine, and chief place of a canton, in the district of La Havre; 7 miles E. of Montivilliers. The place contains 1200, and the canton 11,569 inhabitants, on a territory of 155 kilometres, in 28 communes.

ROMAIN d'Alban, St., a town of France, in the department of the Drôme; 15 miles N.N.W. of Romans.

ROMAIN en Jarez, St., a town of France, in the depart-

ment of the Rhone and Loire; 12 miles N.N.E. of St. Etienne.

ROMAINE, WILLIAM, in *Biography*, a very popular divine of the church of England, was born at Durham in 1714, and educated at Hertford college, Oxford; from whence he removed to Christ-church, where he took his degrees in arts. On entering into holy orders, he became a frequent preacher before the university, and was noted for his zeal in behalf of what were deemed the orthodox doctrines. He removed to London in 1749, and became lecturer at St. Dunstan's church, Fleet-street. He was, for a short time, morning preacher at St. George, Hanover-square, and professor of astronomy at Gresham college, which situation he soon resigned. In 1764 he was chosen rector of St. Anne, Blackfriars, where, and at St. Dunstan's, he continued to preach to large and very crowded congregations almost to his death, which happened in the year 1795. Towards the close of life his voice was feeble, but his manner was very impressive. His works, which are theological, and on the Calvinistical scheme, have been collected in 8 vols. 8vo. He was editor of Calaneo's Concordance to the Hebrew Bible, in 4 vols. folio, in 1749; in which, it is said, he made some unwarrantable alterations to serve the Hutchinsonian doctrine.

ROMAINMOTIER, in *Geography*, a town of Switzerland, in the canton of Berne, from which a bailiwick derives its name; 11 miles S.W. of Yverdon.

ROMAINVILLE, a town of France, in the department of Paris; 5 miles E. of Paris.

ROMALE, a town of Sweden, in West Gothland; 35 miles W.S.W. of Skara.

ROMAN, a town of European Turkey, in Moldavia, on the Siret, the see of a Greek bishop; 145 miles W. of Bender.

ROMAN, Cape, a cape on the west coast of East Florida. N. lat. $25^{\circ} 40'$. W. long. $82^{\circ} 25'$.—Also, a cape on the coast of Chili, in the South Pacific ocean. S. lat. $48^{\circ} 20'$. W. long. $76^{\circ} 40'$.—Also, a cape on the coast of South Carolina. N. lat. $33^{\circ} 5'$. W. long. $79^{\circ} 30'$.—Also, a cape on the coast of Florida, $20\frac{1}{2}$ leagues N.W. by N. from Cape Sable, the S.W. point of the peninsula of Florida.—Also, a cape on the north coast of Terra Firma, being the north point of the peninsula, which is the east limit of the gulf of Venezuela. Due north of it is the island of Orua, or Araba, at eight or nine leagues distance, belonging to the Dutch.

ROMAN County, a county of North Carolina, containing 21,543 inhabitants.

ROMAN, something belonging to the city of Rome.

ROMAN Monarchy. See **MONARCHY**, and **ROME**, infra.

ROMAN, or *Romish Church*, is that of which the pope is head, so called in opposition to the reformed churches. See **PAPISTS**, and **POPERY**. See also **CHURCH** and **REFORMATION**.

The Roman law is the civil law, or the written law, as compiled by the emperor Justinian.

ROMAN Ecclesiastical Singing and Music, during the middle ages. These were in such general favour throughout Europe, that it was the custom, during the times of the greatest musical and mental darkness, when reason and reflection were the least cultivated, for the priests, of almost every part of Europe, to visit Rome, in order to learn canto fermo, and the manner of performing those rites of the church, in which music had any concern. Even those historians who are the least friends to bigotry, and the most ready to combat superstition and papal usurpations, allow that it was only at the court of Rome that the arts of elegance and refinement were at all cherished, during these

times. King Pepin, Charlemagne, and Alfred, had applied to the Roman pontiffs for singing-masters to instruct their subjects.

The learned Jusquin went thither as a singer, during the pontificate of Sixtus IV. And before the year 1600, the names of near twenty Spanish singers and composers are recorded, who were employed in the pontifical chapel. Yet all this proves nothing more than that musicians of great abilities, from whatever part of the world they came, were certain of encouragement there. For more facts to this purpose, see **ITALY**.

ROMAN Games, Ludi Romani, were solemn games, held in ancient Rome, thus called by way of eminence, and on account of their antiquity, as having been instituted by Romulus.

They were sometimes also called *magni ludi*, from the great pomp and expence of them; and sometimes *consualia*, because performed in honour of the god Neptune, who was also called *Consus*, in his quality of god of secret counsels.

They also bore the denomination of *ludi Circenses*, because held in the Circus.

This solemnity, Halicarnassus observes, was originally instituted by Evander, in honour of Neptune, under the name of *Ἰππιος*, whence the festival itself was called *Ἰππιόκλητος*; and was afterwards renewed by Romulus, in honour of the same deity, only under another name.

For Romulus, needing the advice of a god to counsel him in the design he had to furnish his new citizens with wives, applied to the god of secret counsel himself, Consus; proclaimed the Consualia; and invited his neighbours all around to the first celebration thereof. The consequence was the rape of the Sabine women, who came to be spectators of it.

The great ceremony, in these games, consisted in a cavalcade of horses and asses, adorned with garlands; Neptune being reputed the first author of riding on horseback.

Their horses here were of two kinds; *viz.* *πομπικοί*, or such as were merely led up and down for state; and *δρομικοί*, which were for race and exercise.

The other diversions were fencing, and that till one of the combatants was killed on the spot; fighting with beasts, and with the cæstus, or whirlbats; wrestling, running, leaping, sea-fights, horse-races, chariot-races, &c.

These games, Livy tells us, were improved, and rendered much more magnificent, by Tarquinius Priscus. Manutius says, they were held on the eve of the nones of September; *i. e.* on the 14th day of the month.

ROMAN Operas. In treating of the progress of the musical drama, in that ancient and renowned capital, during the former part of the 17th century, it does not appear that any regular theatre was opened there for the performance of operas; nor, indeed, can we discover that any secular musical drama was exhibited there till the year 1632, when "Il Ritorno di Angelica nell' Indie, Drama Musicale," is recorded by Leo Allacci, in his *Drammaturgia*, to have been performed in that city; but without informing us where, or by whom set to music or sung. Several musical dramas, however, were performed there at the palaces of ambassadors, and other great personages, between 1632 and 1661, when "Clearco," set by Tenaglia, a Roman master, was performed. This composer, who had distinguished himself by his productions for the church, is celebrated by P. Della Valle among great Roman musicians in 1640.

The first public theatre, opened for the exhibition of musical dramas at Rome, in modern times, was il Torre di Nona, where "Giafoco" was performed, 1671. No

other theatre seems to have been used for this purpose in that city till 1679, when the opera of "Dov'è Amore, è Pietà," set by Bernardo Pasquini, the famous organist, was represented Nella Sala de' Signori Capranica. This theatre still subsists.

ROMANS, *King of the*, in *Modern History*, is a prince elected and designed successor to the German empire.

ROMAN Alum. See ROMAN ALUM.

ROMAN Balance, *Statera Romana*, the steel-yard.

A ROMAN Charity, among Painters, is a picture of a woman suckling an old man.

ROMAN Indiction. See INDICITION.

ROMAN Knight, &c. See KNIGHT, &c.

ROMAN Language, &c. See LATIN, &c.

ROMAN Order, in *Architecture*, is that more usually called the Composite.

ROMAN Purple now denotes the dignity of a cardinal.

ROMAN Roads. See ROAD and WAY.

ROMAN Year, &c. See YEAR, &c.

ROMANCE, certainly *Romaunt*, and *Romant*, a fabulous relation of certain intrigues and adventures in the way of love and gallantry, invented to entertain and instruct the readers.

M. Fontenelle calls romances poems in prose; and Bossu is not averse to their being admitted as poetical pieces, though not written in verse.

Setting aside the versification, it is certain an epic poem and a romance are almost the same thing. The just notion, therefore, of a romance is, that it is a discourse invented with art to please and improve the mind, and to form or mend the manners, by instructions, disguised under the allegory of an action, or series of actions, related in prose, in a delightful and probable, yet surprising manner.

A just romance consists of two parts: *viz.* a moral, as its foundation, and end; and a fable, or action, as the superstructure and means.

It must also have the manners; that is, the characters must be distinguished, and the manners must be necessary; and it must have all the other qualities of poetical manners.

The incidents must be delightful, and, to that end, rightly disposed and surprising. The sentiments fall under the same rules as in the drama.

But the diction is allowed to be more lofty and figurative; as being a narration, and not having terror or pity, but admiration for its end.

A romance of chivalry, according to the definition of a late writer, is any fabulous narration, in verse or prose, in which the principal characters are knights, conducting themselves, in their several situations and adventures, agreeably to the institutions and customs of chivalry.

As compositions of this kind have a long time been little else but histories of amorous adventures, and feats of knight-errantry, the origin of romances is referred to that of love-histories; and accordingly Dearchus, a disciple of Aristotle, who first wrote of those matters, is usually termed the original author of romances. Though Photius is of opinion, that Antonius Diogenes's book on the errors and amours of Dinias and Dercyllis gave birth to most of the works of this kind. Be this as it will, it is certain the ancients have had their romances as well as we. Such are the amours of Rhodanis and Simonides, described in iambics; such is the romance of Leucippe and Clitophon, composed by Achilles Tatius, a Greek writer, afterwards a bishop; such are the Four Books of Incredible Things, written by Damascius; such are the Ethiopics of Heliodorus, in which he relates the amours of Theagenes and Chariclea. Lastly, under the same class may be ranked the Fables of Parthenius Nicenus,

of Athenagoras, Theodorus Prodromus, Eustathius, and Longus.

Indeed antiquity could scarce be reconciled to such pieces, and always looked on them as abuses. Photius, in his *Bibliotheca*, cod. lxxxvii. gives a frightful account of that of Tatius; and the Ethiopics of Heliodorus, though one of the most modest and most reserved pieces of the kind, met with a very severe treatment. The author was bishop of Tricca, in Thessalia, in the fourth century. Nicephorus tells us, that a synod, considering the danger which might accrue to youth from reading his romance, authorized as it was by the dignity of its author, proposed it to him, either to suppress his book, or renounce his bishopric; and that he chose the latter. But this history is a little doubtful.

Be this as it will, Heliodorus has served as a model to all the romances written since; and the marriage of Theagenes and Chariclea has produced a very numerous issue, even all the romances now extant in the world.

Mr. T. Warton, in his "Dissertation on the Origin of Romantic Fiction in Europe," prefixed to the "History of English Poetry," vol. i. is of opinion, that the peculiar and arbitrary species of fiction, which we call romantic, was entirely unknown to the writers of Greece and Rome; and it appears to have been imported into Europe by a people, whose modes of thinking, and habits of invention, are not natural to that country. Whatever be their origin, which will be a subject of inquiry in the sequel of this article, it must be allowed that the ancient metrical romances were very early superseded by prose works upon the same subjects. These last, although far inferior, in interest and merit, to the poetical tales which preceded them, claimed and obtained a superior degree of credit, founded upon the fiction alleged to be inseparable from metre; upon the degraded state of the minstrels, whose province it was to recite these disparaged rhyming legends; and, above all, upon a grave pretext set up by the author of each prose work, that he had translated it *verbatim et literatim* from an ancient Greek or Latin original. As no such Greek or Latin original for a romance of chivalry has ever been produced, we may be safely allowed to doubt whether any such ever existed. But our ancestors received these accounts with unhesitating credulity, and gravely read the voluminous romances of Lancelot du Lac, and Palmerin of England, as translations from ancient annals, while they rejected with scorn the rhyming legends of the minstrels on the same subjects. Thus the metrical romances were obliged to give way to the prose works, which were, in fact, borrowed from them; and so complete was the substitution of the one species of fable for the other, that the press, which was then invented about the period of this revolution in public taste, groaned under the splendid folios of the former, while the latter remained in obscure manuscripts, or were only printed in the meanest manner, and for the meanest of the people. Thus the very existence of the metrical romance, as a distinct, separate, and more ancient kind of composition, was unknown and unnoticed till the publication of the works of some modern writers.

Bishop Percy, the venerable editor of the "Reliques of Ancient Poetry," seems to have been the first person in our country who directed the public attention to this subject, by an "Essay upon Metrical Romance," prefixed to the third volume of his work, in which the merits and qualities of the poetry and chivalry are critically investigated, and a list given of such metrical romances as had come to his knowledge. The learned prelate was followed by Mr. T. Warton; and not to mention the collectors and publishers of some of the shorter and more ancient of our metrical tales

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of chivalry, both in London and Edinburgh, the first comprehensive and general work upon this interesting subject was undertaken by Mr. Ritson, which was soon succeeded by the more popular and elegant performance of Mr. George Ellis, entitled "Specimens of early English Metrical Romances, chiefly written during the early Part of the 14th Century: to which is prefixed a historical Introduction, intended to illustrate the Rise and Progress of Romantic Composition in France and England." Mr. Ritson's work is a selection of "Ancient English Metrical Romances," containing twelve metrical romances of chivalry; to which is prefixed a long and elaborate dissertation on Romance and Minstrelsy.

In imitation of the archbishop Turpinus, who passed for author of the romance of the Feats of Charlemagne and Orlando, a great number of histories, of the like kind, were written in France, during the time of Philip the Fair; the authors of which seemed to improve on each other, contending who should go farthest in the merveilleux. These books, being intended for polite people, were written in the court language of that age, which was called the *romans*, *romant*, or *romantic*; whence the books themselves were called by those names: and thus, by degrees, *romans*, &c. became the general name of all books of this kind; whence, at length, our *romance*.

To this purpose, Crescimbeni, reciting the several opinions respecting the name *romanza*, derives it from the word *Roma*, and tells us, that it means that vulgar idiom which, with colonies of Romans, passed into Provence, and elsewhere, and was esteemed, even by the barbarians who inhabited those kingdoms, and called *Romano* and *Romanzo*; and in this they wrote the acts and achievements of knights; which writings were, therefore, styled *romanzi*, or *romances*.

Others derive the word from the Spanish *romanfero*, *I invent*; as intimating romances to be mere fictions. And hence it is that the ancient poets of Provence, who were the first great dealers in romances, are called *troubadours*, *q. d.* finders, or inventors.

Crescimbeni remarks, that the Italians derived from Provence, not only the origin and art of writing romances, but also the very subjects on which they were founded; and though it is not precisely known who were the romance writers of Provence, yet many of their romances are found in the Italian libraries; and, indeed, from such a source of poetical fiction as the country of Provence appears to have been, nothing less could be expected than a vast profusion of romances, and other works of invention. See *PROVENÇAL Poets*, and also *MINSTRELS*, with whose history that of romances, of which they were the composers, is nearly connected.

It has been a received opinion amongst modern critics, that the fictions of romance, borrowed from the Arabians, were communicated to the Western world by means of the Crusades. Mr. Warton (*ubi supra*) is of opinion, that although these expeditions greatly contributed to propagate this mode of fabling in Europe, they were introduced at a much earlier period by the Saracens, or Arabians, who came from the northern coasts of Africa, and settled in Spain, about the beginning of the eighth century. From Spain, he imagines, they found an easy passage into France and Italy; and the close connection which subsisted for many centuries between the Welsh and their colonists, the Armorians, might have been the means of bringing them from France into this island. (See *ARMORICA*.) A strict intimacy also subsisted between Cornwall and Wales; and hence we are able to account for Cornwall's being made the

scene and the subject of so many romantic adventures in the French romances. Their language, customs, and alliances were the same; and by British writers, Cornwall, separated from Wales only by a strait of inconsiderable breadth, is frequently styled West Wales. At the invasion of the Saxons, both countries became indiscriminately the receptacle of the fugitive Britons. We find the Welsh and Cornish, as one people, often uniting themselves as in a national cause against the Saxons. They were frequently subject to the same prince, who sometimes resided in Wales, and sometimes in Cornwall; and the kings or dukes of Cornwall were perpetually celebrated in song by the Welsh bards. Traditions about king Arthur are as popular in Cornwall as in Wales; and most of the romantic castles, rocks, rivers, and caves, of both nations are alike distinguished at this day by some noble achievements, at least by the name of that celebrated champion.

Arthur and Charlemagne, according to Warton, are the first and original heroes of romance. And as Geoffroy's history is the grand repository of the acts of Arthur, so a fabulous history, ascribed to Turpin above-mentioned, is the ground-work of all the chimerical legends which have been related concerning the conquests of Charlemagne, and his twelve peers. Its subject is the expulsion of the Saracens from Spain: and it is filled with fictions evidently congenial with those which characterize Geoffroy's history. Some have supposed this romance to have been written by Turpin, a monk of the eighth century, who for his learning, and sanctity, and gallant exploits against the Saracens of Spain, was preferred by Charlemagne to the archbishopric of Rheims. Others suppose it to have been forged under archbishop Turpin's name, about that time; others, very soon afterwards, in the reign of Charles the Bald, that is, about the year 870. Historical evidence concurs with numerous internal arguments to prove, that it must have been compiled after the crusades, or about the year 1110. In the two fabulous chronicles now mentioned, the foundations of romance seem, in Mr. Warton's opinion, to be laid. The principal characters, the leading subjects, and the fundamental features, which have supplied such ample matter to this singular species of composition, are here first displayed. And although the long continuance of the crusades imported innumerable inventions of a similar complexion, and substituted the achievements of new champions, and the wonders of other countries; yet the tales of Arthur and Charlemagne, diversified indeed, or enlarged with additional embellishments, still continued to prevail, and to be the favourite topics. Upon the whole Mr. Warton concludes, that these volumes are the first specimens extant in this mode of writing; but he considers the Saracens, either at their immigration into Spain, about the ninth century, or at the time of the crusades, as the first authors of romantic fiction among the Europeans.

In examining the hypothesis of Dr. Percy and Mr. Mallet, who derive these fictions, in a lineal descent, from the ancient historical songs of the Gothic bards and scalds, he allows this opinion to be in some measure well founded, and that so far it is also reconcilable with his own system.

The scaldic inventions, he says, had undoubtedly taken deep root in Europe, and prepared the way for the more easy admission of the Arabian fabling, about the ninth century, by which they were, however, in a great measure superseded. As a proof of which he observes, that the enchantments of the Runic poetry are very different from those in our romances of chivalry. The former chiefly deals in spells and charms, such as would preserve from poisons, blunt the
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weapons of an enemy, procure victory, allay a tempest, cure bodily diseases, or call the dead from their tombs, in uttering a form of mysterious words, or inscribing Runic characters. The magicians of romance are chiefly employed in forming and conducting a train of deceptions. There is an air of barbaric horror in the incantations of the scaldic fablers: the magicians of romance often present visions of pleasure and delight: and although, not without their alarming terrors, sometimes lead us through flowery forests, and raise up palaces glittering with gold and precious stones. The Runic magic is more like that of Canidia in Horace, the romantic resembles that of Armida in Tasso. The operations of the one are frequently but mere tricks, in comparison of that sublime solemnity of necromantic machinery which the other so awfully displays.

He adds, it is also remarkable, that in the earlier scaldic odes we find but few dragons, giants, and fairies. These were introduced afterwards, and are the progeny of Arabian fancy. Nor, indeed, do these imaginary beings often occur in any of the compositions which preceded the introduction of that species of fabling.

That the ideas of chivalry, the appendage and the substance of romance, subsisted among the Goths, our author readily allows, but not without certain limitations. It was under the feudal establishments, which were soon afterwards erected in Europe, that it received new vigour, and was invested with the formalities of a regular institution.

From the whole of his observations, the author deduces the following general conclusion.

Amid the gloom of superstition, in an age of the grossest ignorance and credulity, a taste for the wonders of oriental fiction was introduced by the Arabians into Europe, many countries of which were already seasoned to a reception of its extravagancies by means of the poetry of the Gothic scalds, who, perhaps, originally derived their ideas from the same fruitful region of invention. These fictions, coinciding with the reigning manners, and perpetually kept up and improved in the tales of troubadours and minstrels, seemed to have centered, about the eleventh century, in the ideal histories of Turpin and Geoffrey of Monmouth, which record the supposititious achievements of Charlemagne and king Arthur, where they formed the ground-work of that species of fabulous narrative called romance. And from these beginnings, or causes, afterwards enlarged and enriched by kindred fancies, fetched from the crusades, that singular and capricious mode of imagination arose, which at length composed the marvellous machineries of the more sublime Italian poets, and their disciple Spenser.

Hearne imagines, that the old metrical romance, called "Richarde cuer de Lyon," was written by Robert de Brunne. It is probable, however, that the leisure of monastic life produced many rhymers, nor is it at all unlikely, but that the monks often wrote for the minstrels, and that many of our ancient tales in verse, containing fictitious adventures, were written, although not invented, in the religious houses. The romantic history of "Guy earl of Warwick" is expressly said, on good authority, to have been written by Walter of Exeter, a Franciscan friar of Caroc in Cornwall, about the year 1292. (Carew's Survey of Cornwall, p. 59.) The libraries of the monasteries were full of romances. Among the many French minstrels invited into England by Richard I., it is natural to suppose that some of them made their magnificent and heroic patron a principal subject of their compositions. We have a romance now remaining in English rhyme (which we have just mentioned) that celebrates the achievements of this il-

lustrious monarch. It is called "Richard, &c." and was probably translated from the French about this period. That this romance, either in French or English, existed before the year 1300, is evident from its being cited by Robert of Gloucester, in his relation of Richard's reign, and also by Robert de Brunne, who wrote much about the same time with Robert of Gloucester; and hence we may infer that Hearne must be mistaken in supposing that he was the author of it.

The French, above all other nations, have applied themselves to this kind of writing; whether it be owing to the natural taste and genius of the people, or to the freedom, &c. with which they converse with the women. They appear to have written metrical romances before or about the year 1200. Some of these seem to have been formed from prose histories, enlarged and improved with new adventures and embellishments from earlier and more simple tales in verse on the same subject. They began chiefly with romances of chivalry: hence their Amadis, in twenty-four volumes; Palmerin d'Oliva; and of England, king Arthur, &c. of which we have an agreeable critique in Don Quixote.

Chrestien de Troys wrote "Le Romans du Graal," or the adventures of Sangrale, which included the deeds of king Arthur, sir Tristram, Lancelot du Lake, and the rest of the knights of the round table, before 1191. Chrestien also wrote the romance of "Sir Percival," and left unfinished "La Charette," containing the adventures of Lanucelot. The first French writers of romance were the *Troubadours*; which see.

The later romances are much more polite; the best of which are the Astrea of d'Urfe; the Cyrus and Clelie of Mademoiselle de Scuderi; the Cassandre and Cleopatre of La Calprenede; Ariane, Francion; and the Adventures of Telemachus, by the late archbishop of Cambrai, worth all the rest.

The Germans, too, have their romances; especially Hercules and Hercules, the Aramena, Octavia, Arminius, Otbert, &c.

The Italians have their Eromena, by Biondi; the works of Loredano, Marino, &c. The Spaniards, who, from their temper and constitution, were extravagantly fond of chivalrous exercises, had their Amadis of Gaul, their Diana, and Don Quixote. Some critics have even supposed, that Spain, having learned the art of romance-writing from their naturalized guests the Arabians, communicated it at an early period to the rest of Europe. The English, their Arcadia, &c. And in modern times, the number has been so great, that our circulating libraries are full of them.

The Argenis of Barclay is rather a satire than a romance.

Although we owe to the Norman minstrels the greater part of the romances now extant, which were avowedly translated into English, as soon as that language superseded the French; yet some few were most probably originally composed in English for the use of the Scottish court, where French was never exclusively spoken, and afterwards imitated or translated by French minstrels. Hence it is curious to observe, that as the earliest French romances were written in England, so the earliest English romances were composed in Scotland.

Mr. Ellis makes an arrangement of romances into classes, introducing each with appropriate remarks. The first class comprehends romances relating to king Arthur; which were probably the earliest in order, and were most popular and numerous. The next class included what he has ventured to call Saxon romances, that is, romances referring to Saxon subjects, and claiming, perhaps, some foundation in the history of that people. Guy of Warwick and Bevis

of Hamptoun occupy this flation entirely. Theſe two, notwithstanding their demerits, equalled, or excelled in popularity, almoſt all the romances of the middle ages. The next is entitled an Anglo-Norman romance, and recites the adventures of no leſs a perſon than Richard Cœur de Lion. The next claſs of romances comprehend ſuch as relate to Charlemagne and his Paladins. Under this head Mr. Ellis has enumerated three, *viz.* Roland and Ferragus, Sir Otuel, and Sir Ferumbras. The next romance is of oriental origin, being the earlieſt tradition of the Seven Wife Malters, long known among the ſchool-boys of this country. To this he has added ten miſcellaneous romances, which we muſt content ourſelves to paſs over without mentioning their names. The importance of the ancient metrical romances in an hiſtorical point of view muſt be acknowledged. They hold out to us, like Shakſpeare's plays, the abſtract and brief chronicles of the time, and demand the conſideration of every hiſtorian. Even in a literary point of view, their merit is not contemptible. It is true, the ſtory is generally rambling and deſultory, utterly incapable conſequently of exciting the pleaſure ariſing from a well-conducted plan, all the parts of which depend upon each other, and tend, each in due degree, to bring on the catastrophe. So far is this from being the caſe, that in a long romance, the adventures uſually are all ſeparated and inſulated; only connected with each other, by their having happened to the ſame hero; juſt as a necklace of beads is combined by the thread on which they are ſtrung. This arrangement, in fact, beſt ſuited the reciters, whoſe narration was to be proportioned to the time and patience of their audience; and whom this looſe ſtructure of ſtory permitted to uſe freedom of compression or dilatation as beſt ſuited their purpoſe, ſince any ſingle adventure might be inſerted without impropriety, or left out without being miſſed. The ſame cauſe accounts for the looſe and often tedious ſtyle in which the miſtrells indulged. It was of conſequence that their ſtanza ſhould be ſo ſimple, as to be eaſily recollected, and their diction ſo copious, as not to ſuffer by any occaſional deficiency of memory. For theſe reaſons, Robert de Brunne tells us, that the common miſtrells were unable to repeat tales written in a concise ſtyle and complicated ſtanza, and that ſuch became *naught* in their imperfect recitation. To theſe faults, we have often to add thoſe of extreme awkwardneſs of contrivance and improbability of incident; but which neither offended the taſte, nor ſhocked the faith of our plain and hardy anceſtors. On the other hand, there is a fort of *keeping* in theſe ancient tales, which did not depend upon the miſtrell's inclination, and from which he could not have departed, if he had a mind to do ſo. This ariſes from his painting the manners of his own time, as they paſſed before his eyes, and thus giving a truth and unity to the chivalrous events he relates, which the modern labourers in the vineyard of romance are utterly unable to imitate. With all the pains theſe laſt can uſe to deck their champions in the antique taſte, they are perpetually confounding the paſt time with the preſent, and are guilty of anachroniſms almoſt as groſs as his who introduced a tea-table ſcene into the-hiſtory of John of Gaunt. Neither is the language in which theſe legends are told altogether unworthy of our applauſe. There often occur paſſages, which, from the ſpirit of the poet riſing with the ſituation, may juſtly claim a rank among the higher and more maſculine orders of poetry. And although, as we have already noticed, the general conduct of the ſtory is deſultory and ſlightly put together, yet many of the individual adventures, of which each long romance is compoſed, are happily conceived and artfully executed. The gloom of ſuperſtition likewiſe added a wild and diſmal effect to the wonders of

the miſtrell; and occaſionally his deſcription of ſupernatural events amounts nearly to ſublimity. See Warton, Ritſon, Ellis, ubi ſupra, and Edinb. Review, N^o XIV.

ROMANCHE, LA, in *Geography*, a river of France, which runs into the Drac, a little above Grenoble.

ROMANENGO, a town of Italy, in the department of the Upper Po; 4 miles E. of Crema.

ROMANIA, a province of European Turkey, containing the territory anciently denominated "Thrace," and deriving its preſent name from New Rome, by which Conſtantinople was diſtinguiſhed. The Turks call it "Rumelia" or "Rumili," and "Icella;" and it is alſo denominated "Romelia." This province is bounded on the N. by Bulgaria, on the E. by the Black ſea, on the S. by the ſea of Marmora and the Archipelago, and on the W. by Macedonia. It is upon the whole a level country, though famous for ſome of its mountains: ſuch are mount Hæmus, which ſeparates it on the N. from Bulgaria; Rhodope, celebrated among the ancients for the catastrophe of Orpheus; and mount Pangæus, which divides this country from Macedonia. The two former are long ridges of mountains, that extend from the frontiers of Macedonia to the Black ſea. The territories that lie among the mountains are cold and barren; but thoſe near the ſea are pleaſant and fertile, producing all kinds of grain, and particularly rice of good quality. This country was anciently divided into ſeveral independent kingdoms: and the Thracian Cherroneſus was alſo governed by its own kings. The preſent inhabitants are Greeks, deſcended from the ancient Thracians, interperſed with Turks. Thrace (which ſee) was formerly diſtinguiſhed by the cultivation of the ſciences and fine arts: but the preſent ſtate of Romania is very different, being wholly deſtitute of perſons of literature. It is governed by three Sangiaks, and divided into as many diſtricts under the denomination Sangiacates. The capital is *Conſtantinople*, which ſee.

ROMANIA, *Cape*, a cape on the S.E. point of Malacca. N. lat. 1° 18'. E. long. 104° 15'.

ROMANO, GIULIO, in *Biography*, the cognomen of Giulio Pippi, the moſt renowned among the immediate ſcholars of Raphael d'Urbino, his heir, and the continuator of his works. He was born at Rome in the year 1492. While a pupil, he followed leſs his maſter's delicacy than energy of character, and chiefly ſignalized himſelf in ſubjects of war and battles, which he repreſented with equal ſpirit and erudition. As a deſigner, he commands the whole mechanism of the human body; and, without fear of error, turns and winds it about to ſerve his purpoſes, but ſometimes overſteps the modeſty of nature. Vafari, who viſited him at Mantua, prefers his drawings to his pictures, as being more full of that original fire which diſtinguiſhes his conception, and was apt to evaporate in the longer proceſs of finiſh: ſome have, with better evidence, objected to the character of his phyſiognomics, as more ſagacious than enamoured, leſs ſimple than vulgar, and often diſmal and horrid, without being terrible. In colour, whether freſco or oil, his hand was as expeditious, and his touch, eſpecially in the former, as decided, as his eye and choice were congenial. Brick lights, violet demi-tints, and black ſhades, compoſe in general the raw, opaque tone of his oil pictures; far different from that characteristic tone which ſignalizes the Battle of Conſtantine, painted by him from the deſign and after the death of Raphael, and which was by Pouſſin admired as being moſt happily adapted to the ſubject. The ſtyle of his draperies is claſſic, but the arrangement of the folds generally arbitrary and mannered; the hair and head-dreſſes of his women are always fanciful and luxurious, but

not always arranged by taste; whilst those of his men frequently border on the grotesque.

After he had completed the Hall of Constantine in the Vatican from the design of his master Raphael, he went to Mantua, where the increased practice and authority, derived from the superintendance of the great works he had just completed, established his reliance on himself; and the patronage of the Gonzaghi roused that loftiness of conception, and gave birth to those magnificent plans, from which Mantua and the palace *del T.*, as from enchantment, rose. To the stores of antique treasures belonging to this great family, of which the statues, busts, and bas-reliefs at present in the academy are but insignificant remains, he added his own; rich in designs of Raphael, and in studies and plans from the antique. No designer ever possessed such industry with so much fire, so much consideration with such fecundity, or combined with equal rapidity such correctness, with great recondite knowledge in mythology and history, and that popularity and care in treating it.

The palace *del T.* furnishes specimens in every class of picturesque imagery. Whatever be the dimension, the subject, or the scenery, minute or colossal, simple or complex, terrible or pleasing, we trace a mind bent to surprise or to dazzle by poetic splendour; but sure to strike by the originality of his conception, he often neglects propriety in conducting his subjects, considered as a series: and in the arrangement or choice of the connecting parts, hurried into extremes by the torrent of a fancy more lyric than epic, he disdains to fill the intermediate chasms, and too often leaves the task of connection to the spectator.

In this palace, Giulio adopted the method of his master. He prepared the cartoons, and the pictures were executed by his pupils; but he retouched, corrected, and gave the last finish to them: unfortunately, his master-strokes have been covered again by modern pencils; and the fable of Psyche, the Allegories of Human Life, the Giants storming Heaven, exhibit now indeed his composition and design, but not his hand: this is better preserved in the paintings of the old palace, or, as it is now called, the Corte of Mantua; which are in fresco, and relate chiefly the histories of the Trojan war. They have the same beauties and defects as those of the palace *del T.*: each singly considered is a proof of the poetic spirit and the practical powers of the master; as a cyclus they want connection and evidence. Helen sleeping, Vulcan forging Arms for Achilles, are beautiful; and Minerva in the act of slaying Ajax, the son of Oileus, sublime. Nor is his versatility less admirable in the Bacchic or amorous subjects; the *capricci* and grotesque conceits with which he decorated the small cabinets of the same palace.

The altar-pieces of Giulio are not numerous. He did not live to finish those which he had begun for the cathedral of Mantua. The most remarkable of those which he finished with his own hand, are the three frescoes at St. Marco; and in the church of St. Cristoforo, the athletic figure of that faint, groaning under the weight of the divine Infant on his shoulders. They are, however, far inferior, for genuine pathos and classic execution, to the Martyrdom of St. Stephen, on the head altar of the church of St. Stephen at Genoa.

Of Giulio's scholars and assistants, the most celebrated were F. Primaticcio, chiefly employed in the stuccoes and ornaments of the palace *del T.*; Benedetto Pagni of Pescia, who accompanied Giulio from Rome to Mantua; and Rinaldo Mantovano, the most expert of the three, and in the opinion of Vasari, who laments the shortness of his life, the greatest painter that Mantua ever produced: the altar-piece

of Sta. Agostina alla Trinita has a grandeur of style above his age, and has by some been suspected to be the design of Giulio. To these may be added Fermo Guifoni, who coloured in the cathedral the Call of St. Peter and St. Andrew, from the most studied and most beautiful cartoon of the master; and Theodore Ghigi, or as he subscribes himself, Theodore Mantovano, a great designer, and so practised in the style of Giulio, that after his death he was selected by the prince to finish several of his works.

In addition to his powers as a painter, Giulio Romano possessed a very considerable knowledge of the principles of architecture; and was employed in plans for several of the palaces at Rome and Mantua. His last architectural exertion was the erection of a splendid mansion for himself at Mantua. Vasari relates, that upon the death of San Gallo, the architect of St. Peter's, Giulio was selected by the pope for his successor, but was prevented leaving Mantua by the interest of the cardinal Duke, and the entreaties of his wife and her immediate friends and relations; and whilst he was endeavouring to surmount these difficulties, and enjoy the proffered honour and emolument, he was seized with illness, and borne to the grave in the year 1546, and in the 54th of his age. He left a son, called, after his respected master, Raphael, of whom nothing remains, but the tradition that he possessed talents worthy of his father. He died in 1560, at the age of 30. Fuseli's Pilkington.

ROMANO, in *Geography*, a town of Italy, in the department of the Adda and Oglio; 11 miles S.S.E. of Bergamo.

ROMANO, or *Ramano Cayo*, a small island off the N. shore of the island of Cuba; it is long and narrow, and lies at the E. extremity of the cluster of isles called the King's Garden.

ROMANO, *St.*, a town of Italy, in the department of the Panaro; 18 miles S.W. of Modena.

ROMANOV, a town of Russia, in the government of Jaroslavl, on the Volga; 16 miles W.N.W. of Jaroslavl. N. lat. 57° 46'. E. long. 39° 40'.

ROMANOVA, a town of Russia, in the government of Irkutsk, on the Angara; 60 miles W.S.W. of Ilimsk.—Also, a town of Russia, in the government of Tambov, on the Olonetz; 16 miles S. of Lipetzsk.

ROMANOVKA, a town of Russia, in the country of the Cossacks, on the Don; 116 miles E.N.E. of Azoph.—Also, a town of Russia, in the government of Upha; 64 miles N.E. of Orenburg.

ROMANOW, a town of Russian Poland, in the palatinate of Kiev; 8 miles N.E. of Zytomiers.—Also, a town of Austrian Poland, in Galicia; 33 miles W. of Przemyl.—Also, a town of Lithuania, called also Romanowo, in the palatinate of Novogrodek; 18 miles N. of Sluck.

ROMANS, a town of France, in the department of the Drôme, and chief place of a canton, seated on the Isere; two posts N.E. of Valence. The place contains 6173, and the canton 15,180 inhabitants, on a territory of 225 kilometres, in 11 communes. N. lat. 45° 2'. E. long. 5° 8'.

ROMANS, *Romani*, *Romanic*, or *Romance*, the polite language formerly spoken at the court of France; in contradistinction to the *Waloon*, or ancient Gaulish, spoken by the common people.

The Romans having subdued the Gauls, introduced part of their language among them; and a mixture of half Latin, half Gaulish, or Celtic, constituted the Romans; of which the modern French is only an improvement.

Hence, to *enromance* was to write in romance, &c. See ROMANCE.

Covarruvias, a learned Spanish writer, observes, that the name

name romance is generical, and belongs alike to the Tuscan, French, and Spanish; inasmuch as all these were derived from the purity of the Latin tongue, which the Romans, being conquerors, introduced into these provinces, and which, at first, the nobles spoke and wrote. He further says, that the Latin tongue, being admitted into Spain, was spoken as in Rome, and that there were men well skilled in it, who spoke and wrote it with greater refinement than the vulgar; but upon the irruption of the Goths it was remarkably corrupted: that which was before *Roman* was converted into *Romance*, which is equivalent to its being derived from the Romans. And it farther appears, that the name *Romance* was given to the Spanish language, to distinguish it from the Gothic.

Mr. Planta, in his elaborate account of the Romanish language (Phil. Transf. vol. lxxvi. part i. p. 129, &c.), which is now spoken in the most mountainous parts of the country of the Grisons, near the sources of the Rhine and the En, informs us, that this language consists of two principal dialects; which, though partaking of the same general name, differ so widely as to constitute in a manner two distinct languages. One dialect, he says, which is spoken in the Engadine, a valley extending from the source of the En to the frontiers of the Tyrol, is by the inhabitants called *Ladin*. And he observes, that the Romanish has never been used in any regular composition in writing, till the sixteenth century, nor affected by any foreign invasion, or intimate connection: but that it is at present the identical language that was spoken two hundred years ago.

This learned writer observes, that notwithstanding the variety of conjectures and controversies, which have occurred with regard to the Gallic Romance, it is agreed on all hands, that the vocabulary of the Roman, and the idiom of the Celtic, have chiefly contributed to its formation; and, therefore, that it partakes of a common origin with that of the Grisons. He adds, that there are incontestible proofs that this language was once universal through France, and that this, and not immediately the Latin, hath been the parent of the Provençal, and afterwards of the modern French, the Italian, and the Spanish.

From a comparison of the two Romances, as well as from the similarity of their origin, Mr. Planta infers, that they are one and the same language.

However, whilst the Grisons neglected to improve their language, or had no opportunity for this purpose, the taste and fertile genius of the troubadours, fostered by the countenance and elegance of the brilliant courts and splendid nobility of Provence, did not leave theirs long in the rude state in which we find it in the ninth century. But the change being gradual, and almost imperceptible, the French historians have fixed no epocha for the transition of the Romance into the Provençal. Nevertheless, it appears, that the former language had received no considerable alteration in the twelfth century, and it still bore the same name. But after this era, though the name occurs, the language distinguished by it is very different from the Romance of the ninth century. Allowing, however, the universal use of the Romance all over France till the twelfth century, and that what the writers of those times say of the Gallic, is to be understood of the Romance, of which there is sufficient evidence, it follows, says Mr. Planta, that the language introduced into England under Alfred, and afterwards more universally established by Edward the Confessor, and William the Conqueror, must have been an emanation of the Romance, very near akin to that which is now spoken in the Alps.

According to Du-Cange, the Romance had also penetrated
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into Scotland before the twelfth century. The same corruption, or coalescence, which gave rise to the Gallic Romance, and that of the Grisons, must also have produced, in Italy, a language much resembling, if not perfectly similar, to those two idioms. It appears also, from what has been already said, that the language of the Romans penetrated very early into Spain, and that the Romance was very common in that kingdom. The universality of the Romance in the French dominions, during the eleventh century, accounts for its introduction into Palestine, and many other parts of the Levant, by Godfrey de Bouillon, and other adventurers, who engaged under him in the crusades.

This writer farther adds, that the heroic achievements and gallantry of the knights of the Cross gave rise to a swarm of fabulous narrations, which, though not an invention of those days, were yet, from the name of the language in which they were written, ever after distinguished by the appellation of Romances. And he presumes, that the Romance hath been preserved so near its primitive state, not only in the country of the Grisons, but in several other remote and unfrequented parts.

Mr. Berington, in his "Literary History of the Middle Ages," recently published, observes, that the language afterwards known by the name of French, was divided into two dialects, both of which bore the name of "Romane," or Romance, because each was formed on the basis of the Roman: that to the north being adulterated by a mixture of Frankish and Norman words; whilst the dialect of the south was vitiated by words transferred from the language of the Ostrogoths, Visigoths, and Alani. The river Loire, not rigidly taken, was their common boundary. The first might be called the "French Romane," the latter the "Provençal," because it was spoken by the subjects of Raymond, count of Provence, well known in the armies of the crusaders. The characters of these dialects, however, though owning a common source, were marked by strong lines of difference. The Provençal, from a milder climate, from a more constant intercourse with strangers, and from a closer affinity to the mother tongue, was soft and harmonious: the French more harsh, as retaining more of its northern mixture. But if we mention the countries in which these languages were current in the 13th century, it will be seen that the Provençal was confined within the limits above assigned it; while the French Romane, overflowing its natural boundaries, became familiar to distant nations. It passed with the conquerors into England, where it was previously fashionable. The Norman settlers rendered it familiar at Naples and in Sicily; though here it was soon vanquished by the superior fascination of the Italian dialect. The crusaders carried it into the East, and planted it in Syria, in Palestine, in Cyprus, and at Constantinople, where it was at least as permanent as the conquests which they had made.

ROMANTRINO, in *Geography*, a town of Italy, in the Novarese; 4 miles E.N.E. of Novara.

ROMANUS I., LECAPENUS, in *Biography*, emperor of the East, rose from an obscure origin to various employments under Leo the philosopher, and was, at one time, possessed of the command of the naval armies. Having rendered himself all-powerful at court, he persuaded the prince Constantine to marry his daughter, banished the empress-mother Zoe to a monastery, and in 919 caused himself to be crowned emperor by the patriarch. He associated his three sons in the imperial authority, and ordered their names, with his own, to be placed in all edicts before that of the lawful emperor Constantine. The adherents of the latter made some attempts to free him from this servitude, but they

were frustrated and punished. During these intestine disturbances, Simeon, king of Bulgaria, renewed his inroads on the empire, and penetrated to the gates of Constantinople. Romanus brought him to accede to terms of peace, and the Roman admiral, about this time, entirely destroyed a Saracen fleet in the harbour of Lemnos. Simeon dying in 927, his son Peter resumed hostilities, and broke into the Constantinopolitan territory, but peace was concluded, and a marriage entered into with the emperor's grand-daughter to the Bulgarian king. An invasion of the Roman dominions in Asia by the Syrian Saracens was repulsed by the imperial general; and the commanders of the armies of Romanus had equal success against the Russians, who had ravaged the empire with a numerous fleet. In the mean time, Romanus lost his eldest son Christopher, and the two remaining brothers quarrelled with each other, and with their father. The youngest son of Romanus formed a conspiracy for his father's dethronement, and in December 944, his apartment was entered by night, and he was conveyed to an island of the Propontis. He there assumed the religious habit and life, and died in 946 in this retreat, a true penitent for the injustice which he had inflicted upon Constantine. Previously to his decease, his two sons were banished to the same island, whom he reproached, when he met them on the beach, for their ingratitude and unkindness to him, nevertheless he very readily allowed them to share of his water and vegetable diet. Lecapenus does not appear, says Gibbon, to have possessed either the virtues or vices of a tyrant. The spirit and activity of his private life dissolved away in the sun-shine of the throne; and in his licentious pleasures, he forgot the safety both of the republic and of his family. Of a mild and religious character, he respected the sanctity, the innocence of youth, the memory of his parents, and the attachment of the people. Univer. Hist. Gibbon.

ROMANUS II., called *the Young*, succeeded his father, Constantine Porphyrogenitus, in 959. He had married Theophano, a woman of mean origin, who was charged with having been chiefly instrumental in the alleged crime of poisoning his father. Romanus was supposed to possess considerable talents, but he was habitually attached to frivolous amusements and dissolute pleasures, and resigned all care of the state to his chief chamberlain. In the morning, this luxurious emperor visited the circus; at noon he feasted the senators; the greatest part of the afternoon he spent in the tennis-court, the only theatre of his victories; from thence he passed over to the Asiatic side of the Bosphorus, hunted and killed four wild boars of the largest size, and returned to the palace, proudly content with the labours of the day. He banished from court his mother Helena, and his two sisters, who were reduced to a state of great indigence.

During the short reign of this emperor, the two brothers, Nicephorus Phocas and Leo, obtained great successes against the Saracens in Crete and the East, while the emperor was wasting his time in indolence. According to some historians, debauchery, but according to others, the evil practices of Theophano, brought his life to a close in the year 963, at the age of twenty-four, and in the fourth year of his reign. Univer. Hist. Gibbon, vol. ix.

ROMANUS III., named *Argyrus*, a patrician of an ancient family, was nearly related to Constantine IX. During the last illness of that emperor, he was offered his daughter Zoe for a wife, with the title of Cæsar. He would readily have declined the high honour intended for him, but was told the loss of his eyes or his life must be the consequence of his refusal. His wife, devoted to his welfare, as well as ardently attached to his person, made way for a new marriage, by retiring herself to a convent, and in 1028 Romanus espoused

the princess Zoe. On the death of Constantine he succeeded to the imperial throne, and began his reign by easing the people of some of their taxes, and performing other popular acts. In the second year of his reign, the Saracens having invaded Syria, the emperor resolved to march in person against them, but he was defeated, with the loss of his baggage, and a great part of his army. After his return, several public calamities in the empire followed, which occasioned him entirely to apply his mind to works of piety. In the mean time the empress Zoe, who, at an advanced age, continued to follow a licentious course of life, attached herself to a new lover of mean birth, whom she wished to raise to the purple, and she justified the Roman maxim, that every adulteress is capable of poisoning her husband. To effect her purpose, she caused the deadly cup to be administered to her husband; and finding it too slow in its operation, she employed an assassin, who suffocated him in the bath. He died in 1034, after a reign of five years and a half. Gibbon. Univer. Hist.

ROMANUS IV., named *Diogenes*, a descendant of Romanus Argyrus, in the regency of Eudocia, widow of Constantine Ducas, engaged in a conspiracy for raising himself to the throne, for which he was tried and condemned to death. This punishment, on account of his fine person, was commuted for a short exile, after which the imperial widow nominated him to the command of her armies, and in 1067 she married him, and he was proclaimed emperor. He had not occupied the throne more than two months, before he put himself at the head of the few troops he could assemble, and crossed the Hellespont to attack the Turkish sultan, who had made incursions into his territories. He came up with the Turks, who were retiring loaded with rich spoils. He attacked and routed them with great slaughter, and pursuing his blow, recovered Aleppo and Hierapolis. In the two following campaigns, Romanus displayed his military talents to great advantage, and finally drove the Turks across the Euphrates. In the fourth campaign he led a numerous army to the deliverance of Armenia. After this he shared in defeat, and was, in a general engagement, left alone, almost in the midst of his enemies, and was taken prisoner by the Turkish sultan, who obliged him to sign an humiliating treaty, and then set him at liberty. During his misfortunes, a revolution was effected at Constantinople: Eudocia had been driven from the throne, and shut up in a monastery; and her eldest son, Michael Ducas, had been proclaimed emperor. Romanus was dethroned, and his eyes torn out with circumstances of so much cruelty that he soon died. This happened in 1071, after a reign of three years and eight months. Univer. Hist.

ROMANUS, pope, was elected to that dignity in the year 897, upon the expulsion of Stephen VI. and VII. Little is recorded of him: he is said by Platina to have annulled the acts of his predecessor, and, in particular, to have declared his proceedings against the corpse and memory of pope Formosus unjust and illegal. Romanus' dignity was of very short duration; he died before he had been in possession of it quite four months. Bower.

ROMAON, ST., in *Geography*, a town of Portugal, in the province of Beira; 19 miles S.S.E. of Viseu.

ROMBACH, a town of the duchy of Wurzburg; 2 miles N. of Hasfurt.

ROMBLON, or ROMBLINO, one of the smaller of the Philippine islands, about 30 miles in circumference. N. lat. 12° 40'. E. long. 121° 58'.

ROMBOUTS, THEODORE, in *Biography*, a native of Antwerp, and born in 1597, was a painter of very considerable merit. At first he studied under Abraham Jansens; but

but in his 20th year he went to Italy, and there began his career as an historical painter. He was patronized by the duke of Tuscany, and painted several large compositions for that prince, who honoured and rewarded him handsomely. On his return to Antwerp he found Rubens in possession of full fame; and soon perceived how difficult it was for him to meet with that degree of estimation at home which he had received abroad. A noble emulation, however, stimulated him to enter the lists with that great master; and though he certainly was not adequate to the combat, yet he exhibited considerable prowess, which even Rubens acknowledged.

As he died at the age of 40, his works are not numerous. The principal ones, among those executed after his return from Italy, were painted for the court-house of Ghent.

He likewise painted pictures of low subjects, such as mountebanks and their attendants, soldiers playing at cards, &c. &c.; which he did as pastime, or merely to acquire money, but they are not among his best performances. On the historical pictures he produced, his reputation rests for support, and is upheld to a considerable rank.

ROME, } in *Geography and History*. The
 ROMAN EMPIRE, &c. } ancient city of Rome, situated on the river Tiber, in east longitude 13° , and about $41\frac{3}{4}^{\circ}$ of north latitude, though in its origin one of the most humble of cities, was destined to become the capital of the largest empire in the ancient world. In modern history it has been famous for being the centre of an ecclesiastical tyranny, under which, for many centuries, the greater part of what may be denominated the civilized world was held in subjection. The city of Rome, without dispute, was founded by Romulus; but we may trace the origin of its inhabitants, that is, of the ancient Romans, to Æneas, the hero celebrated in Trojan story. When the Greeks became masters of Troy, Æneas, with the forces under his command, retired into the fortress, which, for some time, they defended with great bravery; but being at length compelled to yield, he conveyed away his gods, his father, wife, and children, and fled, with a numerous crowd of Trojans attached to him, to the strong places of mount Ida. Here, however, his enemies followed him, and he was obliged to negotiate a peace, the terms of which forced him to quit the Trojan territories altogether: the Greeks, on their part, engaged not to molest him in his retreat. Æneas accordingly equipped a fleet, in order to seek a settlement in some foreign land. The Trojan having crossed the Hellespont, arrived in the peninsula of Pallene, where he built a city, calling it, from himself, Æneia, and left in it a part of his followers. From thence he sailed to Delos, and thence to Cythera, where he erected a temple to Venus. He built another, to the same goddess, in Zacynthus, and in this island he instituted games, named "the races of Venus and Æneas." Wherever the Trojan hero went he left memorials of himself, and in the time of Dionysius these were still existing in the places already mentioned, and in many others, as at Leucas, Actium, Dodona, &c. which were accordingly regarded as indisputable proofs of the reality of Æneas' voyage to Epirus: and "that he came into Italy," says Dionysius, "we have the concurrent testimony of all the Romans; the ceremonies they observe in their sacrifices and festivals bear witness to it; also the Sibylline books, the Pythian oracles, and many other things that nobody can reasonably reject as fable."

Æneas first landed in Italy, after crossing the Ionian sea, at Cape Minerva, in Japygia; from thence he went to Drepanum in Sicily, to which place Elymus and Ægyptus, who had escaped from Troy a little before him, had brought a Trojan colony. Æneas augmented this colony,

by leaving a part of his own followers; and then crossing the Tyrrhenian sea, he bent his course for Italy. He gave the name of Palinurus to the cape at which he first landed, from one of his pilots, who died there. From this place he sailed to several other parts, till at length the Trojan prince, and his faithful attendants, finished their long voyages on the coast of Latium, a small territory on the east side of the river Tiber, which now contains a part of the present Campagna di Roma. Latinus was the king of the country, and the people of it were called Latins. Here Æneas and his followers undertook to raise a second Troy, hoping that they had arrived at the end of their adventures.

When Æneas arrived in Italy, Latinus was engaged in a war with the Rutuli, but his success was very doubtful: he accordingly assigned to Æneas and his followers a track of land for their settlement, upon condition that they should join their arms to his against the Rutuli, who were to be considered as their common enemy. Æneas accepted the conditions offered, and complied with his engagement so faithfully, that Latinus reposed in him the most unbounded confidence, and gave him in marriage his only daughter, Lavinia, thus securing to him the succession to the throne of Latium; hence Æneas changed the name of his camp from Troy, and called it Lavinium, in honour of his wife. The Trojans followed the example of their leader, by making alliances with Latin families; so that in a very short time they became one nation, united by the closest bonds.

There was, however, a cause for considerable strife excited by this union: Turnus, nearly related to the queen, and who had been brought up by Latinus, had entertained hopes of having Lavinia for his wife; when, therefore, he saw that princess given to Æneas, he instantly joined the Rutuli; but in the first battle after this confederacy, both Turnus and Latinus were slain: the consequence of this was, that Æneas came into quiet possession of the kingdom of Latium, which he governed with great wisdom, and transmitted to posterity. His reign was, however, short; but during that period he established the worship of the gods of his own country, and to the religion of the Latins he added that of Troy. The two palladiums, which had been the protectors of that city, became the tutelary deities of Lavinium, and, in after ages, of the whole Roman empire. He introduced, likewise, the worship of Vesta, and appointed certain virgins, called, from her, Vestals, to keep a fire burning in honour of the goddess. Many other deities, who had been revered in Troy, became probably known to the Latins by means of Æneas, which might be the occasion of his being designated by the appellation of the *pious* Æneas. This hero was, at length, obliged to head the united forces of the Latins and Trojans against the Rutuli, who had formed an alliance with Mezentius, king of the Tyrrhenians. A battle ensued, which lasted till night, when Æneas, being pushed to the banks of the Numicus, which was a boundary of Lavinium, and being forced into that river, was unfortunately drowned. The Trojans had, however, address enough not only to conceal his body, but to pretend that, instead of his having been drowned, he was suddenly taken up to heaven, where, in the character of a deity, he was overlooking the conduct of his subjects: who, in honour of the newly-formed god, erected to him a temple, under the title of "Jupiter Indiges."

Upon the death of Æneas, he was succeeded by his son Euryleon, named also Ascanius and Iulus, who contended with Mezentius, and in the end obliged him to sue for peace, which was granted, upon condition that for the future the river Tiber should be the boundary between the Latin

and Etrurian territories. Ascanius was the son of Æneas by his first wife, and of him Lavinia, who was left pregnant by Æneas, began to be jealous, and retired to the woods, where she was delivered of a son, which, from the place of his birth, she named Silvius. Ascanius after a time discovered the place of Lavinia's retreat, and persuaded her to return; from this time he treated Silvius not only as a brother, but resigned to him the kingdom as his rightful inheritance, and built for himself a capital to a new state, which he called *Alba Longa*. After he had reigned twelve years in his new kingdom, Ascanius died, leaving a son, named Iulus, between whom and Silvius the right of succession lay, the latter being the son, and the former the grandson of Æneas. At length the two kingdoms were united under Silvius; and as a compensation to Iulus, he was appointed to sovereign power in matters relating to religion, a power which thenceforward continued in his family. Silvius was succeeded by thirteen kings of the same race, who reigned, it is said, though with no great probability, during a space of 400 years. Of these little certain can be known; one of them, it appears, was named Tiberinus, who engaged in a war which proved fatal to him; for, in a battle which was fought on the banks of the Albulæ, he was forced into that river and drowned, whence the river was afterwards named the Tiber, which appellation it has borne ever since. Agrippa succeeded Tiberinus, and after him Alladius reigned, who was followed by Aventinus, who left his name to a certain hill, in which he was interred. Procas, the successor of Aventinus, was father of Numitor and Amulius, and at his death he bequeathed the throne to Numitor. This prince was driven from the government by Amulius, who, to secure it for himself, murdered Ægeus, Numitor's only son, and forced his daughter, Rhea Sylvia, to devote herself to the worship of Vesta, by which she was obliged to perpetual virginity. Her virtue, it was feigned, was violated by the god Mars; the consequence of which was, that she was delivered of two sons, who were placed in a wooden trough, and sent floating down the Tiber. From this dangerous situation they were rescued by Faustulus, the king's shepherd, and suckled by his wife Acca Laurentia, who, for her want of good conduct, was named *Lupa*, a circumstance that gave rise to the fable of the twins having been suckled by a she-wolf.

Great care was taken of their education, and as they grew up they exhibited something in their appearance and behaviour, that denoted them to be above the common race of shepherds: and at length Faustulus disclosed to them their real descent, which inspired them with the ambition of doing something worthy of their high birth. They had already obtained the names of Romulus and Remus, and before they had arrived at the age of manhood they had taken part in a quarrel between Amulius and Numitor, in which the former was deposed and killed, and the latter placed on the throne of Alba. Numitor, in gratitude for their service, advised them to undertake the founding of a new colony; and to assist them in the project, he bestowed upon them those lands near the Tiber where they had been brought up, supplied them with all kinds of implements for breaking up the ground, and with slaves and cattle, and granted full liberty to his subjects to join them.

For the more speedily carrying on their work, it was thought proper to divide those who were employed in it into two companies, one under each brother; a circumstance which, however well intended, gave birth to two rival factions, which openly manifested themselves when the choice

was to be made of a place for the building of their new city, the one being for the mount Aventine, and the other for the Palatine mountain: disputes on the subject came at last to open hostilities, and Remus was killed. By what means his death happened is not certain; but according to Livy he was killed by the hand of his brother.

Regal State of Rome.—Romulus, being now at the head of the colony, applied all his talents to the rearing of the new city, which he proposed to call after his own name. He fixed upon mount Palatine for its situation, and performed all those ceremonies which were connected with the superstition of the Etrurians. As to the exact year of the foundation of Rome, there is a considerable disagreement among chronologers, but it is generally referred to 753 before the birth of Christ. When the city was finished, which probably consisted of about a thousand houses, or rude huts, the people, being assembled to make choice of a government most agreeable to their wishes, determined upon a monarchy, and resolved to take Romulus as their king. Being, unquestionably, a man of a vigorous mind; he immediately applied himself to the establishment of good order, and to the formation of certain rules or laws by which his subjects were to be bound. He assumed a habit of distinction for himself, appointed twelve lictors to attend him as guards, and divided his subjects into different ranks. The lands he distributed into three portions, one for the support of government; another for the maintenance of religion; and the third he divided into equal portions of two acres to each Roman citizen. After this he formed a senate, consisting of a hundred persons, afterwards increased to 200, chosen from among the superior class of the people, and from whom the Patrician families were descended. This assembly were not only to be judges in matters of small importance, but to debate and resolve upon such public affairs as the king proposed, and to determine them by a plurality of voices. The people at large were allowed to create magistrates, enact laws, and resolve upon any war in which the king should propose to engage. Romulus next proceeded to settle the religious affairs of his people, and he added many of the Trojan deities to those whom the aborigines, or Italian natives, already worshipped. He chose priests, instituted festivals, and laid the foundation of a regular system of religion.

After all that has been attributed to the political sagacity and talents of Romulus, it is probable that the great outlines of the first constitution had a natural foundation in the usages of barbarous nations; though many of his institutions, it will be readily admitted, bear the traces of a discerning and active mind.

The Sabines were the most formidable enemies of the early Romans; but after the death of Romulus, who reigned 37 years, Numa, a Sabine, was elected king. He was, in his own nature, formed for pacific measures, and a worshipper of the gods; he endeavoured to give his people the same character. To increase his influence, and render his government more powerful, he pretended to divine inspiration. As we have seen in some preceding articles, see *CALENDAR*, *NUMA*, &c. he reformed the calendar, divided the year into twelve months, following the course of the moon; and distinguished the days into those in which civil occupations might be carried on, and those that were to be devoted to religious purposes. The business of agriculture was lawful on the latter, as a religious duty. This wise prince reigned forty-three years; and was succeeded by

Tullius Hostilius, whose reign commenced in the year 670 B.C. His disposition was the reverse of that of Numa. He made frequent wars upon his neighbours; and alienated

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the Sabines from the Romans, who became the most powerful of their enemies. Tullius reigned thirty-three years.

Ancus Martius, the fourth king of Rome, grandson to Numa, inherited his virtues, to which he joined the talents of a warrior. He greatly increased the population of Rome, by naturalizing the conquered states; and he built the port of Ostia, at the mouth of the Tiber. His reign continued twenty-four years. See **ANCUS**.

The fifth king of Rome, Tarquinius Priscus, a citizen of Corinth, noted for his great liberality and vast wealth, was victorious in his wars, and he adorned the city with works of utility and magnificence. Such were the **CIRCUS**, the **CAPITOL**; and the **CLOACÆ**, those immense common sewers which led to the belief that Rome had been built on the ruins of an ancient city of much greater magnitude. This king was assassinated in the 38th year of his reign; and was succeeded by

Servius Tullius, his son-in-law, who very much improved the city with useful edifices, and by extending its boundaries. He also made some new arrangements in the division of the citizens; of which we shall have occasion to say more under the biographical article *SERVIVS Tullius*. This king was assassinated, after a reign of forty-four years, by his own daughter Tullia, who had married Tarquinius, the grandson of Priscus, and who thus paved the way for her husband to ascend the vacant throne.

The government of this Tarquin was systematically tyrannical, and from his haughtiness he obtained the surname of *Proud*. By his ill conduct he at length roused the vengeance of the people against him, and they not only expelled the tyrant, but at one blow abolished the regal government at Rome. See **TARQUINIUS**.

The regal form of government subsisted 244 years, during which there were only seven kings, of whom two died violent deaths, and one was deposed. These circumstances throw a considerable degree of doubt on the authenticity of the Roman history, as the reigns of monarchs who die in the common course of nature cannot be averaged so high as thirty years, whereas, notwithstanding the violent deaths and deposition of three of the kings, the average length of their reigns is more than thirty-four years each. Besides, it is admitted that for the first five centuries after the building of Rome, there were no historians, and, according to Livy, almost all the ancient records were destroyed when Rome was taken by the Gauls.

At the period of the abolition of the regal government, the territory of the Romans was extremely limited. The chief use which they made of their victories was to naturalize the inhabitants of some of the conquered states, and so increase their population; thus their strength being always superior to their enterprises, they laid a solid foundation of their empire.

Consular State of Rome.—When the regal government was abolished, it was agreed to commit the supreme authority to two magistrates, who should be annually elected by the people from the Patrician order. To these officers they gave the title of consuls, a name, as it has been said, that was intended to designate the counsellors of the republic, rather than its sovereigns, though, in point of fact, their authority differed scarcely in any thing from that of kings. They had the supreme administration of justice, the disposal of the public money, the power of convoking the senate and assembling the people, raising the armies, and the right of making peace and war. Their authority was, however, limited to a year. The first consuls were Brutus and Collatinus, the husband of that Lucretia whose death had occasioned the revolution which destroyed the regal power.

Tarquin was, at this time, in Etruria, where he got two of the most powerful cities, Veii and Tarquinii, to espouse his cause. He had also numerous and powerful partizans at Rome, and a plot was contrived to open the gates to admit him. The conspiracy was discovered, and Brutus had the mortification to find his two sons in the number of conspirators. He felt it his duty to forget the affection of the parent, and to consider their cases as consul; he accordingly condemned them to be beheaded in his presence. This act of severe justice struck such terror into the Romans, that scarcely any person ventured to oppose the consul; and the efforts that were made to bring back monarchy, proved unsuccessful. To secure themselves against the assaults of every invader, the Romans formed an alliance with the Carthaginians, which subsisted 250 years. All precautions, however, that were used for the preservation of the tranquillity of the state, could not guard the people against the oppression of the nobility. The former soon found that they had only changed their masters, and embraced the mere shadow of liberty. They made heavy complaints; these were followed by acts of rebellion, which occurred about the year B.C. 498. Peace was restored by the creation of a dictator, a magistrate who was elected for the period of six months, and who was invested with absolute and unlimited authority. Lartius, nominated to this office, armed the lictors with axes, summoned the whole people to the public assemblies, and calling over the names, enrolled all such as he judged most fit for the service of his country, inflicting, without hesitation, capital punishment upon those who dared to resist the order.

The spirit of the people, though checked for a time, was not subdued; they again complained, remonstrated, and even rebelled; and Rome, for some years, was the scene of anarchy and sedition. At length the senate, alarmed by the idea of a general revolt, abated their former rigour, in some measure eased the burdens of the people, and secured their future interests by the creation of five new magistrates, called tribunes, who were to be elected annually by the people, whose persons were to be sacred, whose business it was to defend the oppressed, to pardon offences, to arraign the enemies of the people; and, when they judged it necessary, to stop, by their fiat, the whole machine of government.

The tribunes demanded, and obtained, two other magistrates to assist them, who were named Ediles, from the charge of the public buildings of the city being committed to them. From this era, which was about 493 years before the birth of Christ, the commencement of the popular constitution of the Roman republic may be dated.

The power of the tribunes soon rose to an unexpected height, and proved the source of perpetual dissensions in Rome. The nobles and patricians had still in view an aristocratical form of government, while the tribunes aimed at nothing short of a complete democracy, hoping thereby to increase their own power and influence. The tribunes prevailed, and Coriolanus, a patrician of inflexible virtue, was, in the year 491 B.C., banished. Encouraged by the success of the tribunes, Spurius Cassius Viscellinus, an ambitious patrician, aspired to the supreme power. To accomplish his purpose, he flattered the people by proposing the Agrarian law, which caused the most violent commotions in the state. His ambition was, in the end, punished with death, and from this time perpetual contentions and discords subsisted between the tribunes and patricians. The number of the former was increased to ten, and the people procured the right of electing them in an assembly convened by the tribes. From this period the supreme authority in the

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the Roman republic may be considered as having passed completely from the higher order into the hands of the people.

Hitherto the Romans had no written laws. So long as the monarchy subsisted, the will of their kings was to them instead of laws: while the ancient usages, the decisions of the consuls and of the senate were founded, or supposed to be founded, on the principles of natural equity. To supply this defect in the government, the tribunes proposed an establishment of laws, to which, but with great reluctance, the senate assented. Commissioners were accordingly appointed to bring from Athens the laws of Solon, that such of them might be adopted as were suited to the existing constitution of the Roman republic. Ten persons were chosen out of the senatorial order to compose a code of laws from those of Greece, and from the ancient usages of Rome. This system was divided into twelve tables, fragments of which are still to be found in the history of that early period, and which are the basis of the great structure of the Roman jurisprudence. An acquaintance therefore with these ancient laws is deemed of importance. Even in the most flourishing times of the republic, they continued to be of the highest authority. Cicero passed upon them a very high encomium, and from him we learn, that to commit these laws to memory was an essential part of a liberal education. From the twelve tables the juriconsulti composed a system of judicial forms for the regulation of the different tribunals. The Decemviri were invested with all the powers of government; each decemvir presided in his turn a single day, and was during that period invested with sovereign authority, with its insignia the fasces. The other nine officiated solely as judges in the determination of law-suits, and the correction of abuses. An abuse, however, of the most flagrant nature, committed by Appius CLAUDIUS, (see his article,) the chief of their number, was destined to bring their office to an end. Prompted also by the ambition and artifices of this man, the whole body conspired against the public liberty, and even bound themselves by an oath to endeavour to make the government perpetual. The senators, the soldiers, and the people, roused by the tyranny of these usurpers, inflicted the punishment which their crimes so justly merited, and at the same time restored the consular and tribunitian power. This was in the year 449 B.C.

The scale of the people was daily acquiring weight at the expence of that of the highest order. There were however two barriers, which still separated the patricians and plebeians; the one a law, which prevented their intermarriage, and the other, the limitation of all the higher offices to the order of patricians. It was the object of the people to remove these restraints, because then the patricians and plebeians would be on an equality. The first, after a long contest, was agreed to by the senate. This concession stimulated the people to inflexible perseverance in their struggle for the latter. The senate sought a palliative by the creation of six military tribunes instead of consuls, of whom three were to be patricians, and three plebeians. This measure satisfied the people for a short time: the consuls were, however, soon restored. The disorders of the republic, and the frequent wars in which the country was engaged, had interrupted the regular survey of the citizens. This was remedied by the creation of two officers, under the title of Censors, 437 B.C. whose business was not only to make the census every five years, but to inspect the morals, and regulate the duties of the people. The dissensions continued with but little variation, and the people uniformly, as their last resource, refused to enrol themselves,

till overawed by the supreme authority of a dictator. To obviate the frequent necessity of this measure, which enforced but an unwilling obedience, the senate had recourse to the expedient of paying the soldiery, who before had served without hire, as was usual in other countries under the feudal system. To defray this expence, a tax was levied from every person in proportion to his means, and thus a fund was established for the maintenance of the army. The Roman system of warfare now assumed a new aspect. The senate always found soldiers at command, and the army was under its controul: the enterprizes of the republic were more extensive, and its successes more signal and important.

One of the early effects of the new system was a war declared against the Veii, the proud rival of Rome, and its equal in extent and population. After a siege of several years their capital was taken by Camillus, and the Veian territory was added to the Roman empire, in the year B.C. 396. Their dominions, till now confined to the territory of a few leagues, was at this period rapidly extended, and the Romans were, from this circumstance, an overmatch for all their neighbours.

The glory, and other good effects of the conquest over the Veii, were more than overbalanced by the subsequent fatal catastrophe in a war with the Gauls, who, under the command of Brennus, invaded Italy, plundered Rome, and actually burnt it to the ground, B.C. 390. They then retired to their own country loaded with spoils. To the burning of the city, on this occasion, as we have before observed, the Roman writers attribute the loss of all the records and monuments of their early history. The city was speedily rebuilt, but the effects of this calamitous event were long felt. The neighbouring states combined to prevent the Romans from recovering their former power; "but," says the historian, "neither the united efforts of foreign enemies, nor intestine divisions, could ruin a city destined to be the mistress of the world." The Gauls in 367 returned to Italy, but they were no longer successful, and were forced to retreat with the utmost precipitation. About the same time a plebeian was raised to the consulship, and the offices of Prator and Edile were created; the one to administer justice, and the other to inspect the temples and public places. In the mean time hostilities were carried on by the Romans against those provinces that refused to submit to their power, or who made the least attempt at revolt. The war with the Samnites, a hardy nation, who inhabited a large track of southern Italy, which began about this period, was continued for half a century: but its successful termination was speedily followed by the reduction of all the Italian states. In the course of this important war, the Tarentines, allies of the Samnites, fought the aid of Pyrrhus, king of Epirus, one of the most illustrious generals of his age. Pyrrhus landed in Italy with 30,000 men and a train of elephants, about the year 280 B.C. For a few years he was successful, but so soon as the Romans understood his mode of warfare, they became more than a match for him; and when he was making a last effort near Beneventum, he was totally defeated with the loss of 26,000 men. He then abandoned all further views to Italy, and returned with precipitation to his own country, 274 B.C. The hostile states submitted to the victorious power, and Rome, 480 years from its foundation, was now sovereign of all Italy. It may be observed, that the extent of their conquests was as much the effect of wise policy, as of power. They removed to Rome all the leading men of the principal conquered cities, admitting them into their tribes, and thus, in a measure, foisted the pride

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pride of the vanquished, by giving them an apparent share in their own domestic government; while, in arranging the constitution of the cities themselves, they filled their magistracies with illustrious Romans, whose abilities and influence were fitted to command allegiance, respect, and attachment to the Roman government.

The command of the continent did not satisfy the Roman ambition. The Carthaginian state excited their jealousy, and the aid which it had granted to the Tarentines was the pretext for commencing hostilities. Sicily had long been considered as the granary of Italy, and in that island the Carthaginians possessed considerable settlements, and they were ambitious of acquiring its entire dominion. An obvious policy led the Romans to dispute with them this important acquisition, which gave rise to the Punic wars. Sicily was at first the theatre of war between these two nations, which was afterwards removed into Africa, and thence into Spain and Italy. We have however, under the words **CARTHAGE** and **CARTHAGINIANS**, entered so much at large into this subject, as to preclude the necessity of doing here more than adding a few lines to render the Roman history connected. For some time the event was doubtful, but in the year 242 B.C. the Carthaginians were constrained to sue for peace, which they obtained on hard and ignominious terms. Rankling under the disgrace, they soon repaired their losses, collected a numerous army, and entrusted the supreme command to **HANNIBAL**; see his article. In 218 the war was renewed and prosecuted with vigour. The Romans were defeated in several battles, and Rome itself threatened with instant destruction. The prudent and cautious Fabius, then appointed dictator, averted the impending blow. In the course of this second Punic war **Massinissa** declared in favour of the Romans; and **Syphax**, king of Numidia, took up arms against them. **Scipio**, the celebrated Roman general, who carried the war into Africa, defeated the combined forces of **Asdrubal** and **Syphax** in several battles, and Carthage in its turn trembled for its safety. **Hannibal** was recalled from Italy, and defeated with prodigious loss in the year B.C. 202, and peace was concluded between the Romans and Carthaginians in the following year.

Elated with success the most complete, the Roman ambition now exceeded all limits, and aspired at the domination of the whole world. War was proclaimed against **Philip** of Macedon, who was defeated by **Flaminius** in **Thessaly** in the year 197 B.C. and obtained peace by agreeing to pay a tribute. The subjection of Macedon portended the ruin of all the Grecian states.

Antiochus, king of Syria, surnamed the Great, by the persuasion of **Hannibal**, declared war against the Romans, but after three years he was under the necessity of imploring peace, and to accept of terms the most rigorous. The Asiatic war, however, in the event proved fatal to the Romans, whose habits and manners were corrupted by the vices which accompanied the luxury of the East. Previously to this, **Perseus**, the Macedonian monarch, refusing to submit to the conditions that had been imposed on his father, was attacked and defeated by **Paulus Æmilius**, and his kingdom, which had subsisted seven centuries, was reduced to the form of a Roman province.

The most frivolous pretexts were assigned as the causes of the third Punic war, in the year 149 B.C., which ended in the destruction of Carthage, long renowned for arts, opulence, and extent of dominion. Conscious of their utter inability to resist this formidable power, the Carthaginians, after a short contest, offered every submission to save their city, but the Romans insisted that

Carthage should be razed to its very foundation. Despair inspired this miserable people with courage: they determined to make one effort at least, and then, if necessary, to die in the defence of their altars and gods. The effort was in vain, and Carthage, in 146, was taken by storm, its inhabitants cruelly massacred, and the city burnt to the ground. In the same year, the ruin of Corinth, and of the Grecian states, was effected. Greece became a Roman province under the name of **Achaia**. Many other kingdoms shared the same fate, among which were **Numantia** and **Lusitania**. Thus, in the space of about a century, the Romans extended their conquests in Europe, Asia, and Africa.

“This,” says **Mr. Tytler**, “was the era of the dawn of luxury and taste at Rome, the natural fruit of foreign wealth, and an acquaintance with foreign manners. In the unequal distribution of this imported wealth, the vices to which it gave rise, the corruption and venality of which it became the instrument, we see the remoter causes of those fatal disorders to which the republic owed its dissolution.”

All dissensions between the senate and the people had been suspended during their victories and triumphs, but when they had no foreign enemy to contend with, they turned their weapons against themselves. Sentiments of honour and virtue among the great mass of the people were well nigh extinguished; and pride, luxury, and self-interest, succeeded to temperance, severity of life, and public spirit. **Tiberius** and **Caius GRACCHUS**, (see their articles,) beheld, with concern, the universal corruption of the state, and attempted to introduce those reforms that might bring back the people to the former habits of moral discipline. They, however, both fell victims to their zeal for the public good. The tumults which attended, or were subsequent to the exertions of these noble youths, were but the prelude to those civil disorders which followed in quick succession. The Numidian war, which commenced in the year 111 B.C., and which lasted five years, afforded many instances of the injustice, insolence, and venality of the Roman people. In this, **JUGURTHA**, (see his article,) who fought to usurp the crown of Numidia by the most cruel means, obtained the friendship and aid of the Roman senate, who having been bribed for the purpose, declared him innocent of every crime of which he was charged, and decreed to him the sovereignty of half the kingdom.

About this time, 105 B.C. an immense body of fierce barbarians rushed, like a mighty torrent, from the northern regions of Europe, and threatened all before them with utter ruin and desolation. **Marius** alone was able to avert the impending destruction. He defeated the barbarians with great slaughter: but he fought and triumphed merely with a view of furthering his own ambition, which was soon proved to be unbounded. **Sylla**, an artful and aspiring patrician, jealous of the glory and popularity which **Marius** had acquired, boldly stood forward to oppose him. Factions were formed, and preparations made for the doubtful contest. The effects, however, of domestic animosities were suspended by the Social war, which was occasioned by the anxiety of the allied states of Italy to attain the rights of citizenship; but the immediate cause of the war was the murder of **Drusus** the tribune. This war, which ended in the concession of those rights to such of the confederates as should return peaceably to their allegiance, was followed by the more dreadful contest between the opposing factions of **Sylla** and **Marius**. **Sylla**, commanding in a war against **Mithridates**, the most powerful monarch of the East, was superseded, and recalled from Asia. He refused to submit to the order, and having founded his army, found it well disposed to support him

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him in all his measures. "Let us march to Rome," they exclaimed with one voice; "lead us on to avenge the cause of oppressed liberty." Sylla readily listened to the cry, and led his conquering army towards Rome: they entered the city sword in hand; Marius and his partisans fled with precipitation, and Sylla ruled for a time triumphant. He sullied the glory of his victories by many acts of cruelty and barbarity; assumed the title and power of perpetual dictator in the year 82; and after massacring many thousands in cold blood, returned to the station of a private man. It should, however, be observed, that previously to this he had engaged personally in the Mithridatic war, and that during his absence, Marius returned to Italy, and joining his forces to those of Cinna, laid siege to Rome, and compelled the city to absolute submission. After a tremendous and unsparing massacre of all whom they regarded as their enemies, Marius and Cinna proclaimed themselves consuls, without the formality of an election, but Marius died within a very few days after this had happened.

The death of these rivals did not give peace to Rome: Lepidus aspired to succeed Sylla in his power, and Pompey, who was, by much, his superior in talents, cherished the same ambition. While Pompey was employed in the reduction of the revolted provinces of Asia, the conspiracy of Catiline threatened the entire destruction of Rome. It was, however, extinguished by the prudence, foresight, and patriotic zeal of Cicero. The next considerable candidate for popularity and sovereign power was Julius Cæsar, who in the reign of Sylla had been numbered among the proscribed. From the danger attached to his situation he had learned prudence; and while Pompey and Crassus were contending for the command of the republic, Cæsar, who, by attaching himself to either rival, would infallibly make the other his enemy, shewed his talents and wisdom by reconciling them, and thus acquiring the favour and friendship of both. They accordingly agreed to a partition of power, and hence the first triumvirate was formed. Cæsar was elected consul: and he had the command of four legions, and the government of Transalpine Gaul and Illyria. The death of Crassus, in an expedition against the Parthians, dissolved the triumvirate, and the others, Pompey and Cæsar, aspired, as rivals, to an undivided dominion. The term of Cæsar's government was near expiring, but to secure to himself that power which was the object of his ambition, he procured a proposal to be made in the senate by one of his friends, which had the appearance of moderation and justice, namely, that Cæsar and Pompey should either both continue in their governments, or both be deprived of them, as they were equally capable of endangering public liberty by an abuse of power. The motion passed, and Cæsar offered to resign, but Pompey refused, and resolved to maintain his right by force of arms; a civil war was the necessary consequence. The senate were chiefly attached to Pompey, but Cæsar had on his side a victorious army, consisting of ten legions, and the great body of the Roman citizens, whom he had won to his interest by his liberality. Mark Antony and Cassius, at that time tribunes of the people, left Rome for Cæsar's camp. The senate, apprehensive of his designs, and dreading the effects of his power and popularity, passed a decree, branding with the crime of parricide any commander who should dare to pass the Rubicon, a river which was the boundary between Italy and the Gauls, with a single cohort without their permission. Cæsar set at defiance their decree, and marched direct to Rome. Pompey, to whom the senate had committed the defence of the state, was without an army. He quitted Rome, followed by the consuls and a part of the senate, and endeavoured

hastily to levy troops over all Italy and Greece, while Cæsar had triumphantly entered the city, amidst the acclamations of the people, seized the public treasury, and possessed himself of supreme authority without any opposition. Having secured the capital, he set out to meet the lieutenants of Pompey, who had possession of Spain. He defeated them, and subdued the whole country in the space of forty days. On his return, he found he had, during his absence, been nominated dictator; and in the succeeding election he was chosen consul, and thus invested by a double title, with the right of acting in the name of the republic. Pompey had now raised a numerous army, and in the field of Pharsalia the rival armies met: Cæsar was victorious, leaving 15,000 of his enemies dead, while 24,000 surrendered themselves as his prisoners. The battle of Pharsalia, for so it has been named, which happened in the year B.C. 48, decided the fate of the rival chiefs, and that of the empire.

In the space of two years Cæsar gave law to the known world; but his success accelerated his ruin. He took part with Cleopatra against Ptolemy: a war ensued, in which Ptolemy was killed, and Egypt was subdued by the Roman arms. In this war the famous library at Alexandria was burnt to ashes. A revolt of the Asiatic provinces, under Pharnaces, the son of Mithridates, was signally chastised; and the report of the conqueror to the Roman senate was conveyed in three words, *veni, vidi, vici*. Cæsar having added Mauritania to the number of the Roman provinces, returned to Rome absolute master of the empire. It is, however, much to his credit, that from this moment his attention was directed solely to the prosperity and happiness of the people. He remembered no longer that there had been opposite parties: he was beneficent alike to the friends of Pompey as to those attached to himself. He laboured to reform every species of abuse and grievance: and in return he was hailed "the father of his country"—was created consul for ten years, and perpetual dictator. His person was declared sacred, and he had the title of *Imperator* bestowed upon him. Thus the Roman republic finally, by its own acts, resigned its liberties. A conspiracy was formed against him by sixty of the senators, at the head of whom were Brutus and Cassius, and the dictator was stabbed, in the year 44, at the foot of Pompey's statue. Mark Antony improved this favourable opportunity, and became master of the commonwealth: he found, however, a formidable competitor in Octavius, the grand nephew and adopted heir of Cæsar, who, at this critical moment, arrived in Rome, and who gained the senate to his interest. The contest terminated in a civil war, in the course of which Octavius and Antony were reconciled, and they strengthened their hands by admitting Lepidus into their association. Thus was formed the second triumvirate, the effects of whose union were beyond measure destructive. They divided among themselves the provinces, and cemented their union by a deliberate sacrifice, made by each, of his friends to the vengeance of his associates. Antony gave up his uncle Lucius to death; Lepidus his brother Paulus; and Octavius his guardian Toranius and his friend Cicero. Besides these illustrious characters, 300 senators and 3000 knights were put to death. A conspiracy was excited against the triumvirs. Octavius and Antony marched against them; an engagement ensued at Philippi, which decided the fate of the empire: the republican party was annihilated. Antony now sought a recompence for his troops by the plunder of the East. He became the willing conqueror of Cleopatra, for whom he abandoned, and even forgot, glory, ambition, and fame. Octavius saw this phrenzy with delight, and contemplated in it his rival's ruin; and from Lepidus he had nothing to dread,

dread, whose insignificant character drew on him the contempt of his own friends, and whose folly, in attempting an invasion of the province of his colleague, was punished by his deposition and banishment. Antony had lavished the provinces of the empire, in gifts to his paramour and her children. At these enormities the Roman people were justly indignant, and the divorce of his wife Octavia, the sister of his colleague, was the signal of declared hostility between them. An immense armament, chiefly naval, came to a decisive conflict near Actium, on the coast of Epirus. Fortune was favourable to Octavius, and the battle of Actium gave him the empire of the world.

Thus have we traced the history of Rome from its commencement, through all its revolutions, till the final extinction of the republic: before we come to an account of the emperors, we shall notice some particulars relating to the character of the ancient Romans, beginning with the mode of their education, upon which almost every thing depends, with regard to character, in the largest extent of the word.

Roman Education and Literature.—A rigid severity of manners was the characteristic of the Romans under their kings, and in the first ages of the republic. The private life of the citizens, which was frugal, temperate, and laborious, had its influence on their public character. The head of every family had sovereign authority over all the members that composed it, and this power, there is every reason to believe, was seldom, if ever, abused. The Roman laws did not prescribe a system and rules for the education of the young, but the manners of the people supplied this want, and the utmost attention was bestowed on the early formation of mind and character. The Roman matrons did not abandon their infants to mercenary nurses. They esteemed those duties connected with the nurture of their offspring and the rudiments of their education as the highest points of female merit. A remarkable degree of attention was paid to the language of children, and to the attainment of correctness and purity of expression; thus, the Gracchi, the sons of the virtuous and excellent Cornelia, were said to be educated “non tam in gremio, quam in sermone matris.” This was the more necessary, because it was by eloquence more than by the exercise of any other talent that the young Roman could rise to the highest offices and dignities of the state. The exercises of the body were likewise particularly attended to, and whatever had a tendency to harden the temperament, and to confer strength and agility, was regarded as of prime importance. At seventeen a youth was consigned to the care of a master in rhetoric, whom he attended constantly to the forum, or to the courts of justice, for it was necessary to be an orator, to be regarded as an accomplished gentleman.

Before the intercourse with Greece, which took place after the Punic wars, the Roman people were rude and illiterate, and it was not till five hundred years had elapsed, that the regular drama was introduced at Rome, and the earliest Roman plays were, no doubt, translations from the Greek. Of the early Roman drama, Ennius was a great ornament, and from his time the art made a rapid advancement. The comedies of Plautus, the contemporary of Ennius, display much knowledge of human nature, and are still read with pleasure. Cæcilius improved so much on the comedies of Plautus, that he is mentioned by Cicero as, perhaps, the best of the Roman comic writers, but none of his compositions remain. The “*Andria*” of Terence, the first of his comedies, was performed in the year 587 from the building of the city. The comedies of this writer are chiefly borrowed from the Greek of Menander and Apollo-

dorus, and their merit lies in that nature and simplicity which are observable in the structure of the fable; in the delineation of the characters, and in the delicacy and purity of the sentiments. The Roman comedy was of four different species; the *first* admitted serious scenes and personages; the *second* was a representation of ordinary life and manners; the *third* was where the dialogue was not committed to writing, but the subject of the scene was prescribed, and the dialogue was filled up by the talents of the actors; and the *last* included pieces of comedy of the lowest species; farces, or entertainments of buffoonery. The Roman tragedy kept pace in its advancement with comedy; of the best, namely, of Ætius and Pacuvius, there are no remains; those under the name of Seneca are probably the work of different hands.

The most perfect era of Roman literature was the age of Cicero, comprehending all, of the preceding times, whom Cicero might have seen, and all, of the succeeding, who might have seen him. These will include, among others, Sallust, Cæsar, Livy, and Tacitus, as historians. Among the poets were Lucretius, Catullus, Virgil, Horace, Ovid, Tibullus, and Martial. See the several articles in the alphabetical arrangement of the New Cyclopædia.

State of Philosophy and the Arts among the Romans.—In the earlier periods of the republic, the Romans had little leisure to bestow on the cultivation of the sciences, and had no conception of philosophical speculation. It was not till the interval between the war with Perseus and the third Punic war, that philosophy made its appearance at Rome. Some learned Achæians, banished from their country, had settled in various parts of Italy, and applied themselves to the cultivation of literature, and the education of youth, diffusing a taste for those studies hitherto unknown to the Romans. Jealous of the introduction of foreign manners with foreign studies, the senate banished the Greek philosophers from Rome. But Carneades and Critolaus came afterwards in the train of an Athenian embassy, who revived the taste for the Greek philosophy, and left behind them many able disciples who publicly taught their doctrines. As the Roman manners had still a tincture of their ancient severity, the Stoical system prevailed. The philosophy of Aristotle was little known in Rome till the age of Cicero, and even then the great orator complains that Peripatetic philosophy was but little understood at Rome, and, on that account, he sent his son to study its doctrines in the schools of Athens. Lucullus, whose residence in Greece gave him an opportunity of being acquainted with all the different sects, disseminated, on his return to Rome, a very general taste for philosophy. The old and new academy had each their partisans; of the former, the most illustrious disciples were Marcus Brutus and Terentius Varro. Cicero, who must be deemed the most eminent of all the Roman philosophers, is usually classed among the supporters of the new school.

The cultivation of physics, or natural philosophy, seems to have been but little attended to, either by the Greeks or Romans. The natural history of Pliny is the most valuable storehouse of the knowledge of the ancients in physics, economics, and the arts and sciences. The Romans had no natural taste in the fine arts. On the conquest of Greece, an immense field opened at once to their eyes, and they were almost instantly surrounded with the master-pieces of art; but their minds were not sufficiently cultivated to appreciate their excellencies.

The Romans seem to have invented or perfected no art, but that of war. The rest they had from Egypt, Greece, Sicily, and Etruria. In our articles, therefore, concerning

the *Musick of the Ancients*, and *Musical Instruments* of the Greeks, (see MUSIC, and INSTRUMENT, in *Musick*;) those of the Romans are generally included. They, indeed, imitated and adopted many customs, religious rites and ceremonies of the Etrurians; and Plutarch (*Vita Romuli*) mentions it as a prevailing opinion, that the Greek language, which was spoken by the Romans in the time of Romulus, was not corrupted by Italian words. From these accounts it appears that the Romans had not only vocal and instrumental music as well as other arts and sciences from Greece, but even their alphabet, language, religion, and all the learning of which they were possessed during the time of their kings, and the first ages of their republic, these having been originally Greek, though the Romans had them through Etruscan strainers.

The first Roman triumph, according to Dionysius (lib. ii.), was that of Romulus over the Cænenenses; in which, clad in a purple robe, he was drawn in a chariot by four horses. The rest of the army, both horse and foot, followed, ranged in three several divisions, hymning their gods in songs of their country, and celebrating their general with extemporary verses: this account affords a very venerable origin to the improvisatori of Italy; as the event happened in the fourth year of Rome, 749 years before Christ, and the fourth year of the seventh olympiad.

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During the reign of Augustus, except Vitruvius, it does not appear that the Romans had one architect, sculptor, painter, or musician; those who have been celebrated in the arts at Rome, having been Asiatics, or European Greeks, who came to exercise such arts among the Latins, as the Latins had not among themselves; this custom was continued under the successors of Augustus, and those Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia, in all the arts. We find too, not only that each of the best Roman writers was an imitator of some great Grecian model, but are certain that the finest remains in painting, sculpture, and architecture, which still subsist in Italy, were either brought thither from Greece, or were the works of Greek artists, who had left their own ruined and oppressed country, to bask in the warm sun-shine of power and affluence at Rome.

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the emperors; the stage then flourished; the temples were crowded; festivals frequent; and banquets splendid; so that we may suppose it to have been very much used both upon public and private occasions, in so rich, populous, and flourishing a city as Rome, the mistress of the world. But this music must have differed as little from that of the Greeks, as the descriptions of it in Horace and Virgil differ from those to be found in Homer, and the Greek lyric poets.

Notwithstanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced so far in them as the modern Italians have done; who, without any foreign help, have greatly surpassed not only their forefathers the ancient Romans, but even the Greeks themselves, in several of the arts, and in no one so much as that of music, in which every people of Europe have, at different times, consented to become their scholars.

From the success which attended the arms of the Romans, and that dominion which they acquired over the greatest part of the known world, it is natural to conclude that they must have carried the military art to a higher degree of perfection than any other nation of that period. It is the discipline of an army that makes the multitude act as one man; it moreover increases the courage of troops, because each individual confides in the steady co-operation of his associates. From the constant practice of athletic exercises, the Romans were inured from infancy to hardiness and fatigue, and bred to that species of life which a soldier leads in the most active campaign.

Among the ancient nations there were usually but two different arrangements of the troops in order of battle. The one the Phalanx, or close arrangement in parallelograms, intersected only by great divisions; the other the Quincunx, consisting of small companies or platoons, disposed in three straight lines, with alternate spaces between them equal to the space occupied by each company. The military tactics of the Romans are supposed to have been at their highest pitch of excellence during the Punic wars. Hannibal was a master in the science, and the Romans understood how to profit from the instructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæsar. Their intrenchments consisted of a ditch from nine to fifteen feet in depth and width, fenced on the inside by the mound of excavated earth, and on the outside by strong stakes with pointed branches.

In besieging a town, several camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raised, gradually rising in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of lides. On this mound the engines of attack were advanced, till they played on the very spot which the besiegers wished to assail. The same machines were used by the besieged for annoying the enemy. When the batteries from the terrace had silenced those on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decisive of the fate of the town. The great object, therefore, of the besieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the first Punic war. A Carthaginian galley was the first model; and in the space of two months they equipped a fleet of 100 galleys of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to describe, the Romans maintained their different conquests, not by their armies, but by their fleets, which were moored in the large rivers and bays,

and generally preserved a fixed station, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already observed, decided the fate of the commonwealth, and Octavius, now having assumed the name of Augustus, was master of the Roman empire. This emperor new-modelled the state, flattered the people, and rendered monarchy supportable to republicans. Augustus possessed the talent of discerning what character was best fitted for gaining the affections of the people he governed, and versatility of temper and genius to assume it. His virtues, though the result of policy, not of nature, were certainly favourable to the happiness, and even the liberties, of his subjects. The fate of Cæsar might, and probably did, warn him of the insecurity of an usurped dominion; and, therefore, while he studiously imitated what was excellent in his predecessor, he affected a much higher degree of moderation and respect for the rights of the people. Long peace, in which the temple of Janus was shut, which had been open nearly two centuries, since the beginning of the second Punic war; an uniform and temperate government, and prevailing luxury, introduced a slow poison into the vitals of the empire. The national character was changed. The outward form remained; but the animating spirit and vigour had vanished. The Romans thought themselves free, because they had no longer to fight for their liberty. The sovereign kept up the delusion, by maintaining the ancient forms of the republican constitution, in the election of magistrates, &c. though they were nothing more than mere forms. He even pretended to consider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the course of his protracted reign, did he submit to a sort of election. The emperor reposed the most unlimited confidence in Mecænas, by whose counsels all public affairs were conducted, and the most salutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wise instructions, Augustus assumed those virtues to which his heart was a stranger; and which, in their tendency to the happiness of his subjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and son-in-law of the emperor, he bestowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his decease, Julia took Tiberius for her third husband, who became the emperor's son-in-law by a double tie, for Augustus had previously married his mother, Livia. On the death of the emperor, in the 14th year of the Christian era, and in the 44th of his reign, Tiberius succeeded to the throne.

The government established by Augustus, founded, as it unquestionably was, on the power of the sword, not on the consent of the senate and people, degenerated in proportion as the army became corrupted. This prince had resolved to confine the boundaries of the empire to the limits which, he assumed, Nature had pointed out, *viz.* on the west the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the east; and towards the south, the sandy deserts of Arabia and Africa. His immediate successors adopted this resolution. Britain and Dacia were the sole accessions to the empire during the first century of the Christian era. A military spirit was, in some degree, preserved and cherished, when almost every virtue was extinguished; but the discipline of the legions was greatly corrupted by the ambition, or relaxed by the weakness, of the emperors, who confided in the army, and particularly in the strength and fidelity of the Prætorian guards, which

had been formed by Augustus, and were kept up for the protection of the emperor's person. The soldiers were, however, soon roused to a sense of their own power, and of the impotency of the civil authority.

Tiberius, the second emperor, was an unfeeling tyrant, and he took for his counsellor Sejanus, præfect of the Prætorian guards, a man still more cruel and tyrannical than himself. Sejanus conceived the project of placing himself on the throne: for the furtherance of his plans, he caused Drusus, the son of the emperor, to be poisoned, and removed from the sight of the people the sons of Germanicus, who were the natural heirs to the crown. He even persuaded Tiberius himself, under the pretence of a discovery of plots for his assassination, to retire from Rome to the isle of Capræ, and devolve the government upon himself. He had but one step more to the attainment of the object of his ambition: he was on the point of assassinating his master when he was detected, and instantly executed. Tiberius now became negligent of the cares of government, and the imperial power was displayed only in scenes of cruelty and rapine. At length he fell sick, and was strangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

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Nero, the scourge of mankind, succeeded his father Claudius, and for the first five years he reigned with great applause, whence Trajan, said "cunctos principes longè abesse a Neronis quinquennio;" but when his character began to unfold itself, he was found to be a compound of every thing that was base and inhuman. (See his article.) He perished in the 30th year of his age, and the 14th of his reign.

The two succeeding emperors, Galba and Otho, did not reign a year between them; the former was murdered by the soldiers, and the latter died by his own hand.

The reign of Vitellius, the next emperor, was of eight months' duration. He is said to have proposed Nero for his model, and it was just that he should resemble him in his fate. Vespasian, who had obtained from Nero the charge of the war against the Jews, which he had conducted with ability and success, was proclaimed emperor by his troops in the East, and a great part of Italy submitting to his generals, Vitellius capitulated to save his life; but as soon as Rome was taken, the deposed emperor was seized, massacred, and his body thrown into the Tiber.

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the *Music of the Ancients*, and *Musical Instruments* of the Greeks, (see MUSIC, and INSTRUMENT, in *Music*;) those of the Romans are generally included. They, indeed, imitated and adopted many customs, religious rites and ceremonies of the Etrurians; and Plutarch (*Vita Romuli*) mentions it as a prevailing opinion, that the Greek language, which was spoken by the Romans in the time of Romulus, was not corrupted by Italian words. From these accounts it appears that the Romans had not only vocal and instrumental music as well as other arts and sciences from Greece, but even their alphabet, language, religion, and all the learning of which they were possessed during the time of their kings, and the first ages of their republic, these having been originally Greek, though the Romans had them through Etruscan strainers.

The first Roman triumph, according to Dionysius (lib. ii.), was that of Romulus over the Cænienses; in which, clad in a purple robe, he was drawn in a chariot by four horses. The rest of the army, both horse and foot, followed, ranged in three several divisions, hymning their gods in songs of their country, and celebrating their general with extemporary verses: this account affords a very venerable origin to the improvisatori of Italy; as the event happened in the fourth year of Rome, 749 years before Christ, and the fourth year of the seventh olympiad.

Indeed the Romans were later in cultivating arts and sciences than any other great and powerful people; and none of them seem to have been the natural growth of the soil, except the military art; all others were brought in by conquest.

During the reign of Augustus, except Vitruvius, it does not appear that the Romans had one architect, sculptor, painter, or musician; those who have been celebrated in the arts at Rome, having been Asiatics, or European Greeks, who came to exercise such arts among the Latins, as the Latins had not among themselves; this custom was continued under the successors of Augustus, and those Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia, in all the arts. We find too, not only that each of the best Roman writers was an imitator of some great Grecian model, but are certain that the finest remains in painting, sculpture, and architecture, which still subsist in Italy, were either brought thither from Greece, or were the works of Greek artists, who had left their own ruined and oppressed country, to bask in the warm sun-shine of power and affluence at Rome.

Vitruvius, in his *Treatise on Architecture*, has inserted a chapter on music, in which he has given the harmonical system of Aristoxenus; but he introduces it with a complaint of the unavoidable obscurity of musical literature, on account of the deficiency of terms in the Latin tongue, to explain his ideas. "The science of music, in itself obscure," says he, "is particularly so to such as understand not the Greek language." This writer, therefore, who seems to have been the first that had treated of music in the Roman language, confesses the necessity he was under of using Greek appellatives, not only for the notes, but for other parts of the art; which shews, if not the low state of music at Rome when he wrote, which was in the Augustan age, at least whence their music came; and *borrowing* implies *inferiority*. Indeed, the writings of Cicero shew that philosophy, and all the arts and sciences, were wholly furnished to the Romans from Greece, even in the most enlightened times.

Music was, however, in great favour at Rome during the latter end of the republic, and the voluptuous times of

the emperors; the stage then flourished; the temples were crowded; festivals frequent; and banquets splendid; so that we may suppose it to have been very much used both upon public and private occasions, in so rich, populous, and flourishing a city as Rome, the mistress of the world. But this music must have differed as little from that of the Greeks, as the descriptions of it in Horace and Virgil differ from those to be found in Homer, and the Greek lyric poets.

Notwithstanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced so far in them as the modern Italians have done; who, without any foreign help, have greatly surpassed not only their forefathers the ancient Romans, but even the Greeks themselves, in several of the arts, and in no one so much as that of music, in which every people of Europe have, at different times, consented to become their scholars.

From the success which attended the arms of the Romans, and that dominion which they acquired over the greatest part of the known world, it is natural to conclude that they must have carried the military art to a higher degree of perfection than any other nation of that period. It is the discipline of an army that makes the multitude act as one man; it moreover increases the courage of troops, because each individual confides in the steady co-operation of his associates. From the constant practice of athletic exercises, the Romans were inured from infancy to hardiness and fatigue, and bred to that species of life which a soldier leads in the most active campaign.

Among the ancient nations there were usually but two different arrangements of the troops in order of battle. The one the Phalanx, or close arrangement in parallelograms, intersected only by great divisions; the other the Quincunx, consisting of small companies or platoons, disposed in three straight lines, with alternate spaces between them equal to the space occupied by each company. The military tactics of the Romans are supposed to have been at their highest pitch of excellence during the Punic wars. Hannibal was a master in the science, and the Romans understood how to profit from the instructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæsar. Their intrenchments consisted of a ditch from nine to fifteen feet in depth and width, fenced on the inside by the mound of excavated earth, and on the outside by strong stakes with pointed branches.

In besieging a town, several camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raised, gradually rising in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of hides. On this mound the engines of attack were advanced, till they played on the very spot which the besiegers wished to assail. The same machines were used by the besieged for annoying the enemy. When the batteries from the terrace had silenced those on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decisive of the fate of the town. The great object, therefore, of the besieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the first Punic war. A Carthaginian galley was the first model; and in the space of two months they equipped a fleet of 100 galleys of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to describe, the Romans maintained their different conquests, not by their armies, but by their fleets, which were moored in the large rivers and bays,

and generally preserved a fixed station, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already observed, decided the fate of the commonwealth, and Octavius, now having assumed the name of Augustus, was master of the Roman empire. This emperor new-modelled the state, flattered the people, and rendered monarchy supportable to republicans. Augustus possessed the talent of discerning what character was best fitted for gaining the affections of the people he governed, and versatility of temper and genius to assume it. His virtues, though the result of policy, not of nature, were certainly favourable to the happiness, and even the liberties, of his subjects. The fate of Cæsar might, and probably did, warn him of the insecurity of an usurped dominion; and, therefore, while he studiously imitated what was excellent in his predecessor, he affected a much higher degree of moderation and respect for the rights of the people. Long peace, in which the temple of Janus was shut, which had been open nearly two centuries, since the beginning of the second Punic war; an uniform and temperate government, and prevailing luxury, introduced a slow poison into the vitals of the empire. The national character was changed. The outward form remained; but the animating spirit and vigour had vanished. The Romans thought themselves free, because they had no longer to fight for their liberty. The sovereign kept up the delusion, by maintaining the ancient forms of the republican constitution, in the election of magistrates, &c. though they were nothing more than mere forms. He even pretended to consider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the course of his protracted reign, did he submit to a sort of election. The emperor reposed the most unlimited confidence in Mecænas, by whose counsels all public affairs were conducted, and the most salutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wise instructions, Augustus assumed those virtues to which his heart was a stranger; and which, in their tendency to the happiness of his subjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and son-in-law of the emperor, he bestowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his decease, Julia took Tiberius for her third husband, who became the emperor's son-in-law by a double tie, for Augustus had previously married his mother, Livia. On the death of the emperor, in the 14th year of the Christian era, and in the 44th of his reign, Tiberius succeeded to the throne.

The government established by Augustus, founded, as it unquestionably was, on the power of the sword, not on the consent of the senate and people, degenerated in proportion as the army became corrupted. This prince had resolved to confine the boundaries of the empire to the limits which, he assumed, Nature had pointed out, *viz.* on the west the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the east; and towards the south, the sandy deserts of Arabia and Africa. His immediate successors adopted this resolution. Britain and Dacia were the sole accessions to the empire during the first century of the Christian era. A military spirit was, in some degree, preserved and cherished, when almost every virtue was extinguished; but the discipline of the legions was greatly corrupted by the ambition, or relaxed by the weakness, of the emperors, who confided in the army, and particularly in the strength and fidelity of the Prætorian guards, which

had been formed by Augustus, and were kept up for the protection of the emperor's person. The soldiers were, however, soon roused to a sense of their own power, and of the impotency of the civil authority.

Tiberius, the second emperor, was an unfeeling tyrant, and he took for his counsellor Sejanus, prefect of the Prætorian guards, a man still more cruel and tyrannical than himself. Sejanus conceived the project of placing himself on the throne: for the furtherance of his plans, he caused Drusus, the son of the emperor, to be poisoned, and removed from the sight of the people the sons of Germanicus, who were the natural heirs to the crown. He even persuaded Tiberius himself, under the pretence of a discovery of plots for his assassination, to retire from Rome to the isle of Capræa, and devolve the government upon himself. He had but one step more to the attainment of the object of his ambition: he was on the point of assassinating his master when he was detected, and instantly executed. Tiberius now became negligent of the cares of government, and the imperial power was displayed only in scenes of cruelty and rapine. At length he fell sick, and was strangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

Caligula, the son of Germanicus, who was Tiberius's nephew, was the third emperor of Rome. The commencement of his reign was signalized by a few acts of clemency and good policy. But tyrannical and cruel by nature, he substituted military execution for legal punishment. The provinces were loaded with the most oppressive taxes, and daily confiscations filled the imperial coffers. He was assassinated in the 4th year of his reign, and was succeeded by his uncle

Claudius, the son of Octavia, the sister of Augustus, whose short reign, though he was a man of weak intellects, and of little education, was marked by an enterprize of importance. He undertook the reduction of Britain, and after visiting the island in person, left his generals, Plautius and Vespasian, to prosecute a war, which was carried on for several years with various success. The inhabitants of Wales, then denominated the Silures, under their king Caractacus, made a noble resistance, but were finally defeated, and Caractacus was led captive to Rome. The civil administration of Claudius was weak and contemptible; he was the slave even of his domestics, and the dupe of his abandoned wives Messalina and Agrippina. Claudius was put to death in the 15th year of his reign.

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He respected the ancient forms of the constitution, restored the senate to its deliberative rights, and acted by its authority in the administration of all public affairs. Under his reign, and by the arms of his son Titus, was terminated the war against the Jews. They had been brought under the yoke of Rome by Pompey, who took Jerusalem. Under Augustus, they were governed for some time by Herod as viceroy; but the tyranny of his son Archelaus was the cause of his banishment, and also of the reduction of Judæa into the ordinary condition of a Roman province. In the reign of Vespasian, Jerusalem was besieged, and after a blockade of six months, taken by storm, the temple burnt to ashes, and the city buried in ruins. Vespasian associated Titus in the imperial dignity, and soon after died, at the age of 69, in the year 79 of the Christian era.

In elective monarchies, the vacancy of the throne is a moment big with danger and mischief. The Roman emperors, desirous to spare the legions that interval of suspense, and the temptation of an irregular choice, invested their designed successor with so large a share of present power, as should enable him, after their decease, to assume the remainder, without suffering, as it were, the empire to perceive the change of masters. Thus Augustus, after all his fair prospects had been snatched from him by untimely deaths, rested his last hopes on Tiberius, and obtained a law, by which the future prince was invested with an authority equal to his own over the provinces and the armies. Thus, also, Vespasian subdued the generous mind of his eldest son. Titus was adored by the eastern legions; his power was dreaded; but as his virtues were clouded by the intemperance of youth, his designs were liable to be suspected. Instead of listening to such unworthy suspicions, the prudent monarch associated, as we have seen, Titus to the full powers of the imperial dignity: and the grateful son ever approved himself the humble and faithful minister of so indulgent a father.

Vespasian had embraced every measure that might confirm his recent and precarious elevation. The military oath, and the fidelity of troops, had been consecrated by the habits of an hundred years to the name and family of the Cæsars; and although that family had been continued only by the fictitious rite of adoption, the Romans still revered, in the person of Nero, the grandson of Germanicus, and the lineal successor of Augustus. It was not without reluctance and remorse that the Prætorian guards were persuaded to abandon the cause of the tyrant. The rapid downfall of Galba, Otho, and Vitellius, taught the armies to consider the emperors as the creatures of their will, and the instruments of their licence. The birth of Vespasian was very mean: his own merit had raised him, in an advanced age, to the empire. "Such a prince," then, says Gibbon, "consulted his true interest by the association of a son, whose more splendid and amiable character might turn the public attention from the obscure origin, to the future glories, of the Flavian house. Under the mild administration of Titus, the Roman world enjoyed a transient felicity. His character was humane, munificent, dignified, and splendid. In his reign happened that dreadful eruption of Vesuvius, which overwhelmed the cities of Herculaneum and Pompeii; and the public losses from these calamities he repaired by the sacrifice of his fortune and revenues. He died in the third year of his reign, and obtained the most exalted epithet, '*Deliciæ humani generis.*'"

Domitian, the brother of Titus, and suspected of murdering him by poison, succeeded to the empire A.D. 81. He was a most cruel tyrant. A rebellion in Germany gave him an opportunity to signalize the barbarity of his disposi-

tion; and its consequences were long felt in the sanguinary punishments inflicted under the pretence of justice. In this reign, the successes of Agricola in Britain threw a lustre on the Roman arms; nevertheless Domitian treated this brave commander with the basest ingratitude. The emperor was assassinated in the sixteenth year of his reign.

It may not be amiss, before we proceed, to notice, in a geographical sense, the different divisions of the empire under Augustus, and which continued during the reigns of the twelve Cæsars, to that of Adrian. When Augustus made himself master of the Roman empire, its possessions extended almost to all the then known world. He did not, as we have seen, make any attempts to extend the limits of the empire, but took every means, that his great talents could suggest, to preserve his own authority, without rendering the senate and people his enemies. He appeared to surrender to them their ancient authority and rights, and only to attend to those parts of the government which were most laborious and difficult. He even seemed to divide the provinces of the empire between himself and the nation, which provinces he arranged into twenty-six dioceses or departments. Of these he granted twelve to the senate and people, reserving to himself the other fourteen. He had taken care, in this division of the empire, that not only the most considerable provinces should fall to his own share, but that they should be so situated, as to give him a decided pre-eminence over the others. With respect to the departments under the controul of the senate and people, two were governed by proconsuls, and ten by prætors.

I. The two departments governed by proconsuls comprehended Africa, including Africa proper, Numidia, and part of Libya.

II. The ten departments under the government of prætors comprehended that part of Spain denominated Bœtica; Gallia Narbonensis; Sicily; Sardinia, and Corsica; Illyria, and part of Epirus; Macedonia, and part of Greece; Achaia; Bœotia, Acarnania, and part of Epirus; the island of Crete; Cyrenaica, an ancient kingdom of Africa, including the present kingdom and desert of Barca and Tripoli; the island of Cyprus; Bithynia; Paphlagonia; the countries about the Propontis and Pontus.

III. The fourteen dioceses or departments under the immediate authority of the emperor were as follow: Hispania; Lusitania; Celtiberia; Aquitania; the most important parts of Gallia and Belgica; Nericæ, Vindelicia, and Rhætia; Mœsia, comprehending Dardania, Dacia, and Thrace; Dalmatia, and part of Illyria; the Maritime Alps; Cilicia, Isauria, and Lycaonia; Galatia, Pamphylia, and Pisidia; Syria, Little Armenia, Mesopotamia, and all the eastern parts of the empire; Egypt, and part of Arabia; Italy, from the island of Sicily to the Alps.

Nerva, who succeeded Domitian, had scarcely accepted the sovereign power from the murderers of that emperor, before he discovered that he was too aged and infirm to stem the torrent of public disorders, which had multiplied to an alarming degree under the long tyranny of his predecessor. His mild disposition was highly respected by the virtuous, but was treated with great contempt by the guilty. Though he had relations of his own, yet he adopted for his successor a stranger, Trajan, who had commanded with wisdom and success a powerful army in Lower Germany, and immediately, by a decree of the senate, declared him his colleague and successor in the empire. Nerva died in sixteen months after his elevation to the throne.

Trajan possessed every talent and every virtue that can adorn a sovereign. As a warrior, he raised the Roman arms to their ancient splendour, and greatly enlarged the boundaries

boundaries of the empire. He subdued the Dacians, conquered the Parthians, and brought under subjection Assyria, Mesopotamia, and Arabia Felix. Nor was he less eminent in promoting the happiness of his subjects, and the internal prosperity of the empire. He was illustrious in every connection, and in every station of life, and obtained the epithet *Optimus*. He died after a glorious reign of nineteen years. Of this emperor Gibbon remarks, "It is sincerely to be lamented, that while we are fatigued with the disgusting relation of Nero's crimes and follies, we are reduced to collect the actions of Trajan from the glimmering of an abridgment, or the doubtful light of a panegyric. Above two hundred and fifty years after the death of Trajan, the senate, in pouring out the customary acclamations on the accession of a new emperor, wished that he might surpass the felicity of Augustus and the virtue of Trajan."

Adrian, the nephew of Trajan, was nominated to the throne, in the last moments of his predecessor, and his title was peaceably acknowledged. Under his reign the empire flourished; he encouraged the arts, reformed the laws, asserted strict military discipline, and visited all his provinces in person. He adopted a policy very different from that of his predecessor, and judging the limits of the empire too extensive, abandoned all the conquests of Trajan, bounding the eastern provinces by the Euphrates. To his talents as an able politician, he joined an excellent taste in the liberal arts. In the last year of his life he adopted, and declared for his immediate successor, Titus Aurelius Antoninus, and substituting Annus Verus, the son of Ælius Verus, in case of the other's death. Adrian died A.D. 138, at the age of 62.

The emperor Adrian suppressed the departments established by Augustus, and divided the whole empire into eleven parts, as follow.

I. Italy, including two provinces, of which the first comprehends all the country from Picenum to Sicily; and the second from Picenum to the Alps, with the two Rhætias.

II. Africa, comprehending the proconsular part of that country; Numidia, and Mauritania.

III. Hispania, including Hispania Tarraconensis; Bætica, and Lusitania.

IV. Gallia, comprehending Gallia Belgica; Gallia Lugdunensis; Gallia Aquitania, and Gallia Narbonensis.

V. Britanny, comprehending the upper and lower countries of that name.

VI. Illyria, containing seventeen provinces, *viz.* the two Noricas; the Upper and Lower Pannonia, and their appendages; Dalmatia; Mœsia Prima; the Superior and Inferior Dacia; Macedonia; Thessaly; Achaia; the two Epiri, and the island of Crete.

VII. Egypt, including Egypt Proper; Thebais; Libya, and Pentapolis.

VIII. The eastern part of the empire comprehended Palestine; Phœnicia; Cælo-Syria; Syria; the two Cicalias; Isauria; Mesopotamia; Arabia, and the island of Cyprus.

IX. Thrace comprehended Thrace Proper; the Lower Mœsia; Scythia, and the adjoining countries.

X. Pontus included Pontus Proper; Galatia; Bithynia; the two Cappadocias; Paphlagonia, and Armenia.

XI. The Asiatic division comprehended the proconsular part of Asia; Pamphylia; the countries about the Hellespont; Lydia; Pisidia; Lycæonia; the two Phrygias; Lycia; Caria; and several islands, of which Rhodes was the chief.

The Age of the Antonines.—This has by historians been regarded as an era in the Roman empire. Adrian, says the

historian, was resolved to deserve the thanks of posterity, by placing the most exalted merit on the Roman throne. His discerning eye easily discovered a senator about 50 years of age, blameless in all the offices of life; and a youth of about 17, whose riper years opened the fair prospect of every virtue. The elder of these, as we have seen, was declared the son and successor of Adrian, on condition that he himself should immediately adopt the younger. The two Antonines, for so they have been denominated, governed the Roman world 42 years, with the invariable spirit of wisdom and virtue. The former has, on account of his many excellent qualities, been surnamed Pius; the latter, Annus Verus, on his accession, assumed the name of Marcus Aurelius Antoninus. Titus Antoninus Pius has been denominated a second Numa. The same love of justice and peace was the distinguishing characteristic of both princes: but the situation of the latter opened a much wider field for the exercise of those virtues. The wisdom of the former could benefit but a few villages; but Antoninus diffused order and tranquillity over the greatest part of the earth. "His reign," says Gibbon, "is marked by the rare advantage of furnishing very few materials for history; which is, indeed, little more than the register of the crimes, follies, and misfortunes of mankind." In private life, he was an amiable as well as a good man; and he enjoyed with moderation the advantages of his good fortune. He died after a reign of 22 years.

The virtue of Marcus Aurelius Antoninus was of a feverer and more laborious kind. At the age of twelve he embraced, from a conviction of its utility, the rigid system of the Stoics, which taught him to subject his body to his mind, his passions to his reason; to consider virtue as the only good, and vice as the only evil. His "Meditations," composed in the midst of a camp, are not only extant, but still read with delight and advantage; and he even gave lessons of philosophy to the Roman people, as he had before done in several cities of Greece and Asia. War he detested, as the disgrace and calamity of human nature; but when the necessity of a just defence called upon him to take up arms, he readily exposed his person to eight winter campaigns on the frozen banks of the Danube, the severity of which was at last fatal to the weakness of his constitution. Having appeared like a benevolent deity, diffusing around him peace and happiness, he died in Pannonia, in the 19th year of his reign, A.D. 180. His memory was revered by a grateful posterity; and above a century after his death, many persons preserved the image of Marcus Antoninus among those of their household gods.

"If a man," says the historian of these times, "were called on to fix the period in the history of the world, during which the condition of the human race was most happy and prosperous, he would, without hesitation, name that which elapsed from the death of Domitian to the accession of Commodus. The vast extent of the Roman empire was governed by absolute power, under the guidance of virtue and wisdom. The armies were restrained by the firm and gentle hand of five successive emperors, whose characters and authority commanded an involuntary respect. The forms of the civil administration were carefully preserved by Nerva, Trajan, Adrian, and the Antonines, who delighted in the image of liberty, and were pleased with considering themselves as accountable ministers of the laws. Such princes deserved the honour of restoring the republic, had the Romans of their days been capable of enjoying a rational freedom. The labours of these monarchs were overpaid by the immense reward that inseparably waited on their success; by the honest pride of virtue, and by the exquisite delight

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delight of beholding the general happiness, of which they were the authors."

Commodus succeeded to the empire on the death of his father. The measures of this reign were as unimportant as the character of the sovereign was contemptible. Commodus had an aversion from every rational and liberal pursuit, and was in many respects very like Nero. To his other crimes, which he had in common with preceding tyrants, may be added, that he entered the lists as a public gladiator, and actually received a stipend for the slaughter of his helpless antagonists. The concubine and some of the chief officers of this emperor prevented their own destruction, by assassinating him in the thirteenth year of his reign, A.D. 193.

Publius Helvius Pertinax was the next emperor, a man of mean birth, but who had risen to esteem by his virtues and military talents. He disappointed the army of a promised reward for his elevation, and, after a reign of 86 days, was murdered in the imperial palace by the same hands which had raised him to the throne. The empire was now put up to auction by the Prætorians, and was purchased by Didius Julianus; but not paying the stipulated price for his elevation, he was deposed and put to death.

Septimius Severus succeeded, whose intention was to erect the fabric of absolute monarchy, and all his institutions operated to that end. He possessed eminent military talents, and it was his boast, that, having received the empire oppressed with foreign and domestic wars, he left it in profound, universal, and honourable peace. He carried with him into Britain his two sons, Caracalla and Geta; and died at York, in the 66th year of his age, after a reign of eighteen years, A.D. 211. He was succeeded by the two sons just named, whose former mutual hatred of each other was increased by their association in the empire; and Caracalla, with brutal inhumanity, caused his brother to be openly murdered in the arms of his mother. His reign, which was of six years' duration, and full of atrocities, was at length terminated by assassination, A.D. 217.

As it would not be consistent with the limits assigned to this article, neither is it at all necessary, to advance step by step through the succeeding reigns; it will be sufficient to transcribe, with very trifling additions, the names of several of the emperors who followed Caracalla.

The disorders in the Roman empire, which began with Commodus, continued nearly a century, till the accession of Diocletian: and this interval was filled by the reigns of Macrinus and Heliogabalus, who were both slain by the soldiers. Alexander Severus was a just prince and a lover of learning; he was successful in his war against Artaxerxes, the new king of Persia, and after that, was slain by some of his soldiers in an expedition into Germany.

Maximin, Maximus and Balbinus, Gordian, and Philip the Arabian, with his son, in whose reign were instituted the secular games, were all raised to the throne by the prætorian bands, and by them killed. Decius, a severe persecutor of the Christians, was drowned while fighting against the barbarians. After this Gallus was slain by the army, at the end of a reign of two years. The life of Valerianus was devoted to the reformation of the manners of his people; but in a war with Sapor, king of Persia, he was captured and dead alive. Gallienus, the son of Valerianus, was lost in luxury and debauchery, and suffered the empire to be torn from him on all sides by barbarians and tyrants. Hence the 30 tyrants, as they are called, though history records the names of 19 only, rose up against him. Among these was Zenobia, wife of Odenatus, prince of Palmyra, a woman of

marial spirit, who spread her conquering arms far over the Eastern world.

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Constantine made a considerable change in the distribution of the provinces which had not suffered much alteration since the arrangement of Adrian. He subjected the whole empire to the dominion of four prefects of the palace; of whom one was placed over Gallia, one over Italia, one over Illyria, and the other over the Eastern provinces. These prefects had under them *proconsuls* in some of the provinces; in others, *magistrates*, called *consuls*, *presidents*, and *correctors*; and a certain number of provinces over which these were placed being united, formed a vicariat. The *prefect of the palace*, under Augustus, was a military officer, in the order of knights. Tiberius increased the importance of the office; but Antoninus was the first who made use of that officer to promulgate, in his name, the laws of the empire. Hence the prefect of the palace became chief judge, who had authority over all other tribunals. In him were united the several offices of constable, chancellor, and superintendent of the finances. Constantine suppressed this office, as held by an individual, and created four prefects of the palace, who had under them *vicars*, whose power extended over a certain number of countries, forming a diocese or department. These officers had the most considerable influence in their departments, and when they quitted the capital, they left their children with the emperor, as pledges of their fidelity.

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The *presidents* were clothed with a much greater power than that possessed by the proconsuls. They were military officers, and had the power of life and death over the army. It was to one of these officers that the provinces of the empire were subjected in each of the great prefectures: thus,

The prefecture of the Gauls, comprehending twenty-nine provinces, was divided into three vicariats, *viz.* Hispania, Gallia, and Britanny.

I. The vicariat of Hispania included seven provinces, of which three were under consuls, and four under presidents.

II. The vicariat of the Gauls included seventeen provinces; six under consuls, and eleven under presidents.

III. The vicariat of Britanny comprised five provinces; two under consuls, and three under presidents.

The prefecture of Italy included likewise twenty-nine provinces, divided into the proconsulship of Africa, and the vicariats of Rome, Italy, Africa, and Illyria. The vicariat of ROME was under consuls, correctors, and presidents; that of ITALY was under consuls and presidents; that of AFRICA was under consuls and presidents; and that of ILLYRIA under one consul, one corrector, and four presidents.

The prefecture of Illyria included eleven provinces; one under the proconsul of Achaia; the vicariat of Macedonia comprehended five provinces, two under consuls, and three under presidents; the vicariat of Dacia was under one consul, and four presidents.

The prefecture of the East included forty-eight provinces; *viz.* three under the proconsul of Asia; fifteen under the count of the East, a companion to the emperor; six under the prefect of Egypt; seven under the vicariat of Asia; eleven under the vicariat of Pontus; and six under the vicariat of Thrace.

We are now arrived to that state of the Roman empire in which it was governed by Christian emperors, and which may be divided into three distinct periods. The *first* will contain the whole time that the Roman world was governed by one emperor only. The *second* commences with the division of the empire, after the death of Theodosius the Great, and goes down to the extinction of the Western empire under Augustulus. The *third* reaches from the fall of the Western empire to the capture of Constantinople, and the destruction of the whole empire.

Of the Christian Roman Emperors before the Division of the Empire.—The administration of Constantine was, in the early part of his reign, mild, equitable, and politic. Though strongly attached to the Christian faith, he made no great innovations on the religion of the state. He introduced order and economy into the civil government, and repressed every species of oppression and corruption. But his natural temper was severe and cruel, and the latter part of his reign was deformed by rancour and a most sanguinary rigour. From this unfavourable change of character he lost the affections of his subjects; and from a feeling, probably of reciprocal disgust, he removed the seat of the Roman empire to Byzantium, where a new city was raised; from his name it was called CONSTANTINOPLE; see the article. The court followed the sovereign: the opulent proprietors were attended by their slaves and retainers. Rome was in a few years depopulated, and the new capital swelled almost at once to an enormous magnitude. In an expedition against the Persians, Constantine died at Nicomedia, in the 30th year of his reign, A.D. 337. During this reign the Goths had made several irruptions on the empire, and though repulsed and weakened, they began gradually to encroach on the provinces.

Before we proceed with the monarchs, we may just notice some particulars relating to the state of the Roman empire at this period; for which we shall be chiefly indebted to Mr. Tytler's Elements, already quoted and referred to.

Instead of the ancient republican distinctions, which were founded chiefly on personal merit, a rigid subordination of rank and office now went through all the orders of the state. The magistrates were divided into three classes, distinguished by the unmeaning titles of, 1, the Illustrious; 2, the Respectable; and 3, the Clarissimi. The epithet of *Illustrious* was conferred on, 1, the consuls and patricians; 2, the prætorian prefects of Rome and Constantinople; 3, the masters-general of the cavalry and infantry; and 4, the seven ministers of the palace.

The consuls were created by the sole authority of the emperor; their dignity was inefficient, and their names served only to give the legal date of the year. The dignity of patrician was not hereditary, but was bestowed as a title of honour by the emperor on his favourites. The prætorian prefects were the civil governors of the four departments of the empire. These were the East, Illyria, Italy, and the Gauls: to them was committed the supreme administration of justice, and of the finances.

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The intercourse between the court and the provinces was maintained by the construction of roads, and the institution of regular posts or couriers; under which denomination were ranked the numberless spies of government, whose duty was to convey all kinds of intelligence to the seat of empire. Taxes were levied by the sole authority of the emperor, and subsidies were exacted from all the cities, under the name of free gifts, on various occasions of public concern, as the accession of an emperor, the birth of a prince, &c.

An impolitic distinction was made between the troops stationed in distant provinces, and those in the heart of the empire. The latter, denominated *Palatines*, enjoyed a higher pay, and more particular favour, and having less employment, spent their time in idleness and luxury; while the former, called *Borderers*, who, in truth, had the care of the empire, and were exposed to perpetual hard service, had, with an inferior reward, the mortification of feeling themselves regarded as of a meaner rank than their fellow-soldiers. Constantine also debased the body of the army by the intermixture of Scythians, Goths, and Germans. This mass of heterogeneous parts, which internally laboured with the seeds of dissolution and corruption, was kept together for some time by the vigorous exercise of despotic authority.

Constantine had divided the empire among five princes, three of them his sons, and two nephews; but Constantius, the youngest of the sons, finally freed himself from all his competitors, and ruled the empire alone. During his reign, the Franks, Saxons, Alemanni, and Sarmatians, laid waste all the fine countries on the banks of the Rhine, and the Persians made the most destructive incursions on the provinces of the East. Constantius wasted his time in theological controversies; but before his death, he appointed his cousin Julian to the dignity of Cæsar. He died A.D. 361.

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ROME.

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Commodus succeeded to the empire on the death of his father. The measures of this reign were as unimportant as the character of the sovereign was contemptible. Commodus had an aversion from every rational and liberal pursuit, and was in many respects very like Nero. To his other crimes, which he had in common with preceding tyrants, may be added, that he entered the lists as a public gladiator, and actually received a stipend for the slaughter of his helpless antagonists. The concubine and some of the chief officers of this emperor prevented their own destruction, by assassinating him in the thirteenth year of his reign, A.D. 193.

Publius Helvius Pertinax was the next emperor, a man of mean birth, but who had risen to esteem by his virtues and military talents. He disappointed the army of a promised reward for his elevation, and, after a reign of 86 days, was murdered in the imperial palace by the same hands which had raised him to the throne. The empire was now put up to auction by the Prætorians, and was purchased by Didius Julianus; but not paying the stipulated price for his elevation, he was deposed and put to death.

Septimius Severus succeeded, whose intention was to erect the fabric of absolute monarchy, and all his institutions operated to that end. He possessed eminent military talents, and it was his boast, that, having received the empire oppressed with foreign and domestic wars, he left it in profound, universal, and honourable peace. He carried with him into Britain his two sons, Caracalla and Geta; and died at York, in the 66th year of his age, after a reign of eighteen years, A.D. 211. He was succeeded by the two sons just named, whose former mutual hatred of each other was increased by their association in the empire; and Caracalla, with brutal inhumanity, caused his brother to be openly murdered in the arms of his mother. His reign, which was of six years' duration, and full of atrocities, was at length terminated by assassination, A.D. 217.

As it would not be consistent with the limits assigned to this article, neither is it at all necessary, to advance step by step through the succeeding reigns; it will be sufficient to transcribe, with very trifling additions, the names of several of the emperors who followed Caracalla.

The disorders in the Roman empire, which began with Commodus, continued nearly a century, till the accession of Diocletian: and this interval was filled by the reigns of Macrinus and Heliogabalus, who were both slain by the soldiers. Alexander Severus was a just prince and a lover of learning; he was successful in his war against Artaxerxes, the new king of Persia, and after that, was slain by some of his soldiers in an expedition into Germany.

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Julian possessed many heroic qualities, and his mind was formed by nature for the sovereignty of a great people; but having been educated under the philosophers at Athens, he had unfortunately conceived a rooted antipathy to the doctrines of Christianity. The reformation of civil abuses

formed the first object of his attention, after which he endeavoured, but without persecution, to undermine and extinguish the Christian religion. To avenge the injuries which the empire had sustained from the Persians, Julian marched into the heart of Asia, and in an engagement, though crowned with victory, he was slain at the age of thirty-one, after a reign of three years.

Jovian, a captain of the guards, was chosen to succeed Julian, who purchased his safe retreat by the ignominious surrender of five provinces. His reign, of seven months only, was mild and equitable, and he restored the Christians to all their privileges as subjects.

Valentinian was chosen emperor by the army on the death of Jovian, who associated with himself in the empire his brother Valens, to whom he gave the dominion of the Eastern provinces, reserving to himself the Western. Valentinian favoured the Christian faith, but did not persecute its adversaries, which was very unlike the conduct of Valens, who, intemperately supporting the Arian doctrine, set whole provinces in a flame, and drew upon the empire a swarm of invaders, in the disguise of friends and allies, but who, in the end, entirely subverted it. These were the Goths, who, migrating from Scandinavia, had, in the second century, settled on the banks of the Palus Mæotis, and thence gradually extended their territory. In the reign of Valens they possessed themselves of Dacia, and were known by the distinct appellation of Ostrogoths and Visigoths, or Eastern and Western Goths. Valentinian died on an expedition against the Alemanni, and was succeeded in the empire of the West by Gratian, his eldest son, a youth of sixteen years of age. Valens was the scourge of his people. The Huns, of Tartar or Siberian origin, now poured down on the provinces both of the East and West. The Goths fled before them. The Visigoths were allowed by Valens to settle in Thrace; the Ostrogoths asked the like liberty, and, being refused, forced their way into the same province. Valens gave them battle at Adrianople; his army was defeated, and he himself slain in the engagement. The Goths, unresisted, ravaged Achaia and Pannonia, and were several times within sight of the walls of Constantinople.

Gratian took Theodosius as his colleague, who, on the early death of his associate, and minority of his son Valentinian II., governed with great ability both the Eastern and Western empire. Theodosius obtained the surname of Great, and having reigned till A.D. 395, he died, leaving two sons, Arcadius and Honorius, assigning to them separate sovereignties. Arcadius was proclaimed emperor of the East, and Honorius emperor of the West. The Eastern empire comprehended Asia Minor, Arabia, Syria, Egypt, Libya, and the several regions on the Danube. The Western empire included Italy, Spain, France, Britain, Germany, Pannonia, and Africa. The Eastern empire subsisted many ages, but the Western soon became the prey of barbarians.

It may be observed, that the reign of Theodosius was signalised by the downfall of Paganism, and the full establishment of the Christian religion in the Roman empire: for, from the time of Numa to that of Gratian, the Romans preserved the regular succession of the several sacerdotal colleges, the pontiffs, augurs, vestals, flamens, &c. whose authority, though weakened in the latter ages, was still protected by the laws. Even the Christian emperors held, like their Pagan predecessors, the office of pontifex maximus. Gratian was the first who refused that ancient dignity as a profanation. In the time of Theodosius, the cause of Christianity and Paganism was solemnly debated in the Roman senate; Christianity was triumphant, and the senate issued a decree for the abolition of Paganism, the destruction of

which in the capital was soon followed by its extinction in the provinces.

Of the Western Empire.—In the reigns of Arcadius and Honorius, the sons and successors of Theodosius, the barbarian nations established themselves in the frontier provinces both of the East and West. Theodosius had committed the government to Rufinus and Stilicho during the minority of his sons: of their fatal dissensions the enemies of the empire took every advantage. The Huns overspread Armenia, Cappadocia, and Syria. The Goths, under Alaric, ravaged the borders of Italy, and laid waste Achaia to the Peloponnesus. Arcadius purchased an ignominious peace, by ceding to Alaric the whole of Greece. This prince, now styled king of the Visigoths, prepared to add Italy to his new dominions. He passed the Alps, and was carrying all before him, when he was defeated by Stilicho, then at the head of the armies of Honorius. In the course of a few months, a torrent of Goths breaking down upon Germany, forced the nations whom they dispossessed, *viz.* the Suevi, Alani, and Vandals, to hasten out of Italy. They joined their arms to those of Alaric, who, being thus suddenly reinforced, determined to overwhelm Rome. Stilicho to ward off the threatened danger, promised him, if he would retire, 4000 pounds weight of gold, which engagement Honorius would not ratify. Alaric was not to be trifled with, and he took ample revenge by the sack and plunder of the city. He was anxious to spare the lives of the vanquished, and to preserve the ancient edifice from destruction. This event happened in August 410. Alaric had, as we have seen, ravaged Greece, some time before; and Arcadius, more wise than his brother, was contented to purchase his friendship, by investing him with the matter-generalship of the Eastern Illyricum. He died within a week of the capture of Rome, and was succeeded by Ataulfus, or Adolphus, to whom Honorius gave his sister Placidia in marriage, and, with her, ceded to his brother-in-law a large portion of Spain. With these concessions Adolphus was contented, and, having concluded a peace, he retired into Gaul, A.D. 412. A great part of what remained of Spain had before been occupied by the Vandals. Honorius allowed, soon after, to the Burgundians a just title to their conquests in Gaul. Thus the Western empire was by degrees mouldering from under the dominion of its ancient masters.

In the East, Arcadius died in 408, leaving that empire to his infant son, Theodosius II., whose sister, Pulcheria, swayed the sceptre with prudence and talent during a government of 40 years. Honorius died A.D. 423. The laws of Arcadius and Honorius are, with very few exceptions, remarkable for their wisdom and equity; a singular circumstance, considering the personal character of those princes, and evincing at least that they employed able ministers.

In the reign of Valentinian III., the hordes from the north of Europe again abandoned their own forests and mountains, in quest of new settlements. Under the command of ATTILA (see his article), they defeated the Roman armies, A.D. 452, and threatened total destruction to the empire. He was for a time ably opposed by Ætius, Valentinian's general; the emperor himself being shut up in Rome by the armies of the barbarian, and at length compelled to purchase a peace. On the death of Attila, his dominions were dismembered by his sons, whose dissensions gave a temporary relief to the declining empire. Valentinian was put to death by the guards of his general Ætius, A.D. 455. He was succeeded by Maximus, who had excited the death of Valentinian, and who now married his widow Eudoxia. Within three months of this event he

was deprived of his kingdom by Genferic, king of the Vandals, who was invited by Eudoxia to revenge the murder of her first husband, and deliver her from the power of the tyrant. Maximus fled, but being taken, he was killed, and his body thrown into the Tiber. Genferic carried Eudoxia and her two daughters into Italy, one of whom he married to his son Hunneric, the other he sent back to Constantinople, and married the mother himself.

After Maximus, we have a succession of seven or eight princes, but the events of their several reigns merit no detail. In the reign of Romulus, surnamed Augustulus, the empire of the West came to a final period. Odoacer, prince of the Heruli, subdued Italy, but spared the life of Augustulus, on the condition of his resigning the throne. This occurred A.D. 476. Odoacer retained the possession of Italy during 14 years. In this period, the estates of the Roman senators were divided among his countrymen and soldiers. At the extinction of the Roman empire in the West, Rome and Italy came into the possession of the Ostrogoths. Africa was seized by the Vandals; Pannonia by the Huns; Spain by the Goths, Alans, and Suevi; Gaul by the Franks; and Great Britain by the Saxons. Hence we see the origin of those nations, many of which have proved so illustrious in history.

We cannot close this portion of the history, without some reflections relating to the rise and fall of Rome. The foundations of the greatness of this vast empire have been enumerated as follow. The fidelity of the citizens to each other, and to the state, was confirmed by the habits of education, and the prejudices of religion. Honour, as well as virtue, was the principle of the republic. The ambitious citizens laboured to deserve the solemn glories of a triumph; and the ardour of the Roman youth was kindled into active emulation, as often as they beheld the domestic images of their ancestors. The temperate struggles of the patricians and plebeians had finally established the firm and equal balance of the constitution; which united the popular assemblies with the authority and wisdom of the senate, and the executive powers of a regal magistrate. When the consul displayed the standard of the republic, each citizen bound himself by the obligation of an oath, to draw his sword in the cause of his country, till he had discharged the sacred duty by a military service of ten years. This wise institution continually poured into the field the rising generation of freemen and soldiers; and their numbers were reinforced by the warlike and populous states of Italy, who had yielded to the valour, and embraced the alliance of the Romans. From their institutions of peace and war, Polybius had deduced the spirit and success of a people, incapable of fear, and impatient of repose. The ambitious design of conquest was attempted and achieved, and the perpetual violation of justice was maintained by the political virtues of prudence and courage. The arms of the republic, sometimes vanquished in battle, always victorious in war, advanced with rapid steps to the Euphrates, the Danube, the Rhine, and the ocean; "and the images of gold, or silver, or brass, that might serve to represent the various nations, and their kings, were successively broken by the iron monarchy of Rome."

The rise of a city, which swelled to an empire, may deserve, as a singular prodigy, the reflection of a philosophic mind: but the decline of Rome was from the natural and inevitable effect of immoderate greatness. Prosperity ripened the principles of decay; the causes of destruction multiplied with the extent of conquest; and as soon as time or accident had removed the artificial supports, the stu-

pendous fabric yielded to the pressure of its own weight. "The story of its ruin," says Gibbon, "is simple and obvious; and instead of inquiring why the Roman empire was destroyed, we should rather be surprised that it subsisted so long. The victorious legions, who, in distant wars, acquired the vices of strangers and mercenaries, first oppressed the freedom of the republic, and afterwards violated the majesty of the purple. The emperors, anxious for their personal safety, and the public peace, were reduced to the base expedient of corrupting the discipline, which rendered them alike formidable to their sovereign and to the enemy. The rigour of the military government was relaxed, and finally dissolved, by the partial institutions of Constantine; and the Roman world was overwhelmed by a deluge of barbarians."

The decay of Rome has often been ascribed to the translation of the seat of empire; but the powers of government were divided, rather than removed. The court of Constantinople was erected in the East; while the West was still possessed by a series of emperors, who held their residence in Italy, and claimed an equal inheritance of the legions and provinces. This impaired the strength, and fomented the vices of a double reign; the instruments of an oppressive and arbitrary system were multiplied; and a vain emulation of luxury was introduced and supported between the successors of Theodosius. Extreme distress, which unites the virtue of a free people, embitters the factions of a declining monarchy. The hostile favourites of Arcadius and Honorius betrayed the republic to its common enemies; and the Byzantine court beheld with indifference, or pleasure, the disgrace of Rome, the misfortunes of Italy, and the loss of the West. Under the succeeding reigns, the alliance of the two empires was restored; but the aid of the Oriental Romans was tardy, doubtful, and ineffectual; and the national schism of the Greeks and Latins was enlarged by the perpetual difference of language and manners, of interest, and even of religion. Yet the event justified and did credit to the decision of Constantine. During a long period, as we shall see, his impregnable city repelled the victorious arms of barbarians, protected the wealth of Asia, and commanded, both in peace and war, the important freights which connect the Euxine and Mediterranean seas. The foundation, therefore, of Constantinople seems to have more essentially contributed to the preservation of the East, than to the ruin of the West.

On the decline or ruin of the Roman empire, great ignorance and darkness, as to letters and the useful arts of life, began to overshadow the Western world. A barbarous people, untaught in letters, poured themselves into the Western provinces of the Roman empire, and gave the first blow to learning. Academies were ruined, libraries burnt, and the learned compelled to shut up their schools and books too. Nor were those, who in that age were denominated Christian priests, less concerned in the destruction of letters; for as they had been loaded with contempt and injuries, when Paganism prevailed, by the philosophers, they not only armed themselves against those teachers, but endeavoured to forbid their writings, as containing tenets the most dangerous and pernicious to young persons. Both hastened the destruction of letters: nevertheless the age was not destitute of learned men, of whom the following have, among others, been enumerated. Those professing Christianity are Sulpicius Severus, Cyril of Alexandria, Sozomen, Sozomen, Theodoret, Isidore, Sidonius Apollinarius; and among the Pagans, Zosimus and Olympiodorus were of the greatest note.

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For the Roman senate, their magistracy, consuls, soldiery, tribes, courts, names, weights, measures, coins, and other matters relating to the antiquities of that people, their policy, religion, law, customs, &c. see the respective articles in this work.

Of the Eastern Empire.—The emperors who reigned in the East, previously to the ruin of the Western empire, were Arcadius, Theodosius II., of whom we have spoken, Marcian, who married Pulcheria, the sister of Theodosius, and Leo the Thracian, who reigned 17 years, and died in 474. He was succeeded by his grandson, Leo, the boy who died in his cradle. His father, Zeno, followed, who, in 475, was driven from the throne by Basiliscus, an usurper; but in the following year he recovered it.

The period in which the emperors reigned singly, after the destruction of the Western empire, includes almost a thousand years, extending from 476 to the year 1453; in which year Constantinople was taken by Mohammed II. We shall only notice some of the most celebrated, beginning with Zeno, who, as we have just observed, had been, after a short rebellion, restored to the throne.

Augustulus, at the command of Odoacer, signified his resignation to the still existing assembly of the Western empire; and that assembly, in their last act of obedience to the Roman prince, still affected the spirit of freedom, and the forms of the constitution. An epistle was addressed to Zeno, in which they solemnly disclaim the necessity, or even wish, of continuing any longer the imperial succession of Italy; since, they say, that it is their opinion, the majesty of a sole monarch is sufficient to pervade and protect the East and the West. They, therefore, in their own name, and in the name of the people, consent that the seat of universal empire shall be transferred from Rome to Constantinople: they renounce the right of choosing their master, the only vestige that yet remained of the authority which had given laws to the world; and they add, that the republic might safely be confided in the civil and military virtues of Odoacer, and humbly request that the emperor Zeno would invest him with the title of patrician, and the administration of the diocese of Italy. The deputies of the senate were received at Constantinople with some marks of displeasure and indignation; and when they were admitted to the audience of Zeno, he at first reproached them with the ill usage of some of their emperors, particularly of Anthemius and Nepos. The first, said he, you have murdered, and the second you have expelled; but while he lives, he is your lawful sovereign. Zeno, notwithstanding his harangue, very soon abandoned the cause of his abdicated colleague. His vanity was gratified by the title of sole emperor, and by the statues erected to his honour in the several quarters of Rome. He entertained a friendly correspondence with Odoacer; and he gratefully accepted the imperial ensigns, the sacred ornaments of the throne and palace, which the barbarian monarch was not unwilling to remove from the sight of the people. Zeno died in the year 495, and was said to have been entombed while he was in one of his drunken fits, and before he was dead. He was succeeded by

Anastasius I. who married Adriadne, Zeno's widow, and by her influence was raised to the throne. See ANASTASIUS.

Justin, of whom we have, in the alphabetical order, given a full account, followed Anastasius, and after a reign of nine years he died, leaving his power to JUSTINIAN, see his article, who destroyed the kingdom of the Vandals in Africa by means of his general Belisarius, and that of the Ostrogoths by Narfes. He is particularly famous in having

built the church of St. Sophia, and in having abolished the consulship, long since only a name without power. He died A.D. 565, and was succeeded by Justin II., who established the exarchate of Italy, and who died mad in the year 578. He was followed by Tiberius, one of the captains in Justin's guards, who died in about four years, having first appointed his own great captain Mauritius as a successor. Mauritius, and all his family, were murdered by Phocas, who exercised the same cruelty in his government, as he had in his way to it. He was dethroned by Heraclius in 611, who succeeded him. During the reign of Heraclius, the Persians made very destructive ravages in the empire; this was the period, also, in which Mohammed, prince of the Arabians, founded the Mohammedan religion and power. This new power quickly weakened the empire, by depriving it of almost all its provinces in Asia and Africa. Heraclius died of a dropy, after a reign of about 30 years. In the course of a few months, Constantine, Heraclionas, and Constans, all ascended the throne; the two first were cut off in a few months. The latter attempted to fix the seat of empire at Rome, but changing his plans, he went to Sicily, where he was killed, leaving three sons to succeed him, who held the government during the remainder of the seventh century. In the eighth, we have Leo Isauricus, or Leonomachus, so called from the persecutions which he instituted against the worshippers of images; also the empress Irene, who restored image worship, and who cruelly put out the eyes of her own son Constantine, for presuming to take the government into his own hands when he was of age.

In the ninth century, the chief among the Eastern emperors were Nicephorus, who dethroned Irene, and who acknowledged Charles the Great, king of France, to be the emperor of the West. Also, Leo VI., surnamed Philophus, the author of the constitutions that bear his name.

In the tenth century flourished, among many other emperors, Constantine IX., son of Leo VI., who took possession of the kingdom of Naples, after driving out the Saracens; and Romanus, the son of Constantine IX., who was likewise successful against the Saracens, but he died of debauchery. Nicephorus Phocas, a general of Romanus, married his widow, and assumed the government in prejudice to the sons of his late master. Nicephorus conquered the Saracens, and took Antioch; but he lost Apulia and Calabria, which were taken by Otho the Great, the emperor of Germany. Nicephorus was at length assassinated by his successor, John Zimisces, who associated with himself on the throne Basilus and Constantine, the two sons of Romanus. Zimisces was poisoned by his chamberlain; Basilus and Constantine recovered Apulia and Calabria, and they reigned together fifty years.

In the 12th century, Apulia was lost by Romanus Argypulus, and in the same period we have Alexius Comnenus, under whom the Crusades took their rise; and John Comnenus, the son of Alexius, whose excellent disposition obtained for him the name of Colojoannes. In his wars with the Turks he was mortally wounded, and was succeeded by his second son, Manuel Comnenus, who has been characterized for his great perfidy. He has been charged with poisoning the provisions which he had engaged to furnish for the army of the emperor Conrad, and at the same time betrayed his designs to the Turks, against whom he was marching. He was succeeded by Alexius II., his son, whose eyes were torn out, and himself deposed and murdered by his cousin Andronicus, who had previously to this assassinated the empress mother. Andronicus ordered a general massacre of all the

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the Latins at Constantinople, and his cruelties not being confined to them, he was at length torn to pieces by his own people. The territories of his successor, Isaac Angelus Comnenus, were ravaged by the emperor Barbarossa; the emperor himself dethroned, and his eyes put out by his brother Alexius the tyrant, who seized on the reins of government, but was himself soon detested, as well on account of his conduct towards Angelus, as for the debaucheries and cruelties of which he was guilty. The crusaders, wishing to free the people from this tyrant, laid siege to the city, and took it. Alexius was glad to escape with his life, and young Alexius, the son of Isaac, was placed on the throne. This young prince, with the assistance of the Latins, restored his father. His coadjutors, in this act of piety, not receiving the price stipulated for their services, plundered Constantinople, and set it on fire. Upon this the Greeks revolted, and chose Alexius Ducas for their leader, who having caused the young Alexius to be strangled, was himself declared emperor. He was, however, deposed by the Latins, in the year 1204, and this was the commencement of what has been called the

Latin Empire.—Baldwin, earl of Flanders, was the first monarch of this dynasty. This prince was killed in a war with the Bulgarians. About the year 1206, David Comnenus, grandson of Andronicus, made himself master of Trebizond, a city of Asiatic Turkey, on the Black sea, which was afterwards considered as the capital of the Greek empire, and continued so till 1462, when it was taken by Mohammed II., and the reigning emperor, with his family, were carried prisoners to Constantinople, where they were mostly put to death.

Baldwin was succeeded, in the Latin empire, by Henry, at the same time that Theodore Lascaris was acknowledged emperor of the Greeks. These two princes made peace. But Henry was afterwards poisoned at Thessalonica, and was succeeded by Peter de Courtenay, a grandson of Lewis le Gros, who was hailed emperor while he was at Auxerre, of which he was the count. He was murdered by Theodore Angelus Comnenus, and was succeeded, in 1220, by Robert, the second son of Peter, the eldest having refused the crown. This Latin emperor made peace with Theodore Lascaris, in order that he might revenge the death of his father, by turning his arms against Theodore Angelus; but Lascaris dying, and being succeeded, in 1222, by John Ducas, Robert found employment in defending himself and his own rights. Under John Ducas the Latin empire was restrained within very narrow limits, and on the death of its emperor, Robert, in 1228, Baldwin II. Robert's brother, was raised to the throne. Baldwin was but eleven years old when he came to the crown. During his reign the Bulgarians laid siege to Constantinople, but were obliged, by the efforts of the Genoese and Venetians, to raise it. Baldwin went into the West to seek succours against his enemies; in the mean time John Ducas died, and was succeeded, in 1255, by Theodore Lascaris II., whose reign was short; and he was succeeded, on the Greek throne, by Michael Paleologus in the year 1260, who, in the following year, attacked and took Constantinople, and thus put an end to the Latin empire, after it had subsisted about fifty-seven years.

New Empire of the Greeks.—Michael Paleologus having obtained the sovereignty of both empires, endeavoured by all the means in his power to unite the Greek and Latin churches, but without effect. His whole reign, which lasted almost twenty-four years, was greatly agitated by dissensions from within his kingdom, as well as by external enemies. He was succeeded by

Andronicus Paleologus in 1283, who, during a long reign of 46 years, conducted himself extremely ill, suffering himself to be led into every fault by ambitious and designing persons; of these the chief actors were the clergy, to whom he was ever subservient. During his government the Turks made dreadful ravages on the empire. He was at last dethroned by his grandson,

Andronicus II. who had been associated in the government with the late emperor. In this reign also the Turks made great progress, notwithstanding the efforts of Andronicus to oppose them. After a reign of about 17 years he was succeeded by his son,

John Paleologus, who was very young when he came to the throne, and during his minority the government was committed to John Cantacuzenus, who, for some time, performed all the duties connected with his high station on principles of wisdom, united to great moderation. But in 1345 he assumed the imperial title in Thrace, and in 1347 took Constantinople, compelling the lawful prince, John, who had married his daughter, to retire to Salonica. But the exiled emperor, with the aid of the Genoese, obtained his rights, and compelled the usurper to quit the throne and capital; see his article. During the reign of John, the Turks were continually making inroads on the empire, and were often at the very gates of Constantinople. The eldest son of the emperor conspired against his father, but was defeated in his rebellions. During this reign the Genoese made themselves masters of Lesbos, and Amurath I. took the city of Adrianople. John died in 1391, and was succeeded by his second son,

Manuel, who, on the death of his father, was at the court of Bajazet: he made his escape, and came to Constantinople, where he was crowned. He was successful in his wars upon the Turks, took Bajazet prisoner, and afterwards defeated the son, so that the Turks were driven entirely from Constantinople. He was embroiled in a contest with the sultan Amurath: this prince laid siege to Constantinople, on which occasion cannon were, for the first time, employed in the armies of the East. At length the Turks and the Greeks made peace, and in a very short time after Manuel died, and was succeeded by

John II. in the year 1425, who made a most disgraceful peace with Amurath. In a short time he perceived his error, and fought on all sides for assistance. To obtain the requisite aid from the princes in the West, who had refused him succours on account of the schism of the Greeks, he laboured hard to reunite the two churches. While he was losing his time at the council of Ferrara, the Turks were making great progress. After this, Amurath was defeated by the celebrated Huniades, king of Hungary. At length John made peace with Amurath, and ended his days in peace. His brother,

Constantine Dragases, succeeded him in 1448, and upon the death of sultan Amurath, the empire of the Turks fell to Mohammed II. With this high-minded prince Constantine had the temerity to embroil himself, of which he had ample occasion to repent, for Mohammed laid siege to Constantinople, which he took, after the most extraordinary efforts of courage, as well on the part of the besieged, as on that of the besiegers. This event took place on the 29th of May, 1453. Constantine, not being able to save his capital, refused to survive its hard fate, and was killed in attempting to defend it. Mohammed did every thing in his power to stop the carnage, and afterwards caused the city to be the capital of his empire. Such was the end of the Greek empire, which had succeeded to the Latin empire.

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Thus have we traced the progress of the Eastern empire, till it no longer existed; yet for some ages, as we have seen, it not only firmly but proudly lifted up its head, conscious of its vast superiority over the other existing governments of the world, particularly in the reign of Justinian, who overturned the Vandals in Africa, and the Goths in Italy; but in process of time, as has been shewn, it declined in its power, and was dismembered of its parts one after another. As in almost all other cases, the misconduct of the emperors not only hastened the ruin of the empire, but was the primary and leading cause of it. The Bulgarians claimed and obtained a part of the empire; as did the Saracens, who possessed themselves of Syria, Palestine, Egypt, Cilicia, and all the adjacent regions; and after that, overrunning the rest of the Roman world, laid siege to Constantinople. These were the followers of the prophet Mohammed, who, believing the whole world was destined for them as an inheritance, attacked the neighbouring nations with a fury, that, in many cases, was absolutely irresistible. It was in this state of things, when the empire could scarcely defend itself against these Saracens, that Constantinople, as we have seen, was taken by Baldwin, earl of Flanders. It was at this period that another emperor took his station at Trebifond, that city and the regions round it being torn from the rest of the Roman empire. At last the Turks totally destroyed that empire. They first, in the reign of Heraclius, passing through the Caspian straits, wandered over divers countries in the East, embraced the Mohammedan religion, and were divided into several principalities. But the other tribes becoming extinct, the posterity of Othoman alone took the lead, and ever since the Turkish sovereigns have assumed the name and title of Othomans, or Ottomans. These, having subdued the greatest part of the provinces which had been possessed by the Saracens, swallowed up the rest of the Roman empire. Constantinople, since its capture in 1453, has been the seat of the Turkish emperors; of course it claims no longer our notice in this article.

Affairs of Rome after the Ruin of the Western Empire.— We have already observed, that Italy was subdued by the Heruli, whose prince, Odoacer, out of contempt to Rome, fixed his seat at Ravenna. These Heruli were, however, soon driven out of Italy by the Ostrogoths, whose king, Theodoric, erected a new kingdom in Italy, and chose Verona to be the royal seat for him and his posterity. This kingdom lasted from the year 493 to 553; but in 541 Totila succeeded to the throne of the Goths, who in the course of his reign captured the city of Rome, and abandoned it to his soldiers, intending in the end to have razed it to the ground, but was prevented from executing his plan by Belisarius. Teia, the successor of Totila, and the last king of the Ostrogoths, was defeated and slain by Narfes, who succeeded Belisarius as general of the armies of Justinian. By this general the kingdom of the Goths in Italy was totally destroyed. Soon after the Longobards erected another kingdom in Italy, and claimed, under their king Alboin, that part of Italy which is still called Lombardy. Their royal seat was Ticinum or Pavia, and their kingdom flourished from 568 to 774, when Charlemagne having taken their capital, carried their last prince, Desiderius, with his family, into France. While the Lombards ruled in Italy, the other parts of that country were in subjection to exarchs or prefects, who were usually sent by the emperor to Constantinople. These, in some measure, resisting the Lombards, defended the remains of the empire there, and fixed their seat at Ravenna. This exarchate lasted 185 years, *viz.* from 568 to 752, in which year Aistulphus,

king of the Lombards, took Ravenna by force. The kingdom of the Lombards being extinct, all Italy, which had been comprehended under the exarchate and kingdom of the Lombards, fell to the kings of France. Charlemagne was first proclaimed patrician, and soon after emperor, of the Roman people. As the people were prompted to this act by the bishop of Rome, Charles gave a large part of the exarchate and other lands to the bishops of Rome, who became the temporal as well as the spiritual fathers of the people. They contrived at this period a peculiar kind of dominion, which received great strength and advantage from the general ignorance that then prevailed in the West. The bishops of Rome claimed to be the vicars of Christ, and successors to Peter, chief of the apostles, and had therefore a right to prescribe laws to all the Christian world. Formerly, on account of the pre-eminence of the city of Rome, only the bishops of that city claimed a superiority in matters of religion. But when they saw that the bishops of Constantinople assumed to themselves, because the seat of empire had been transferred to that city, the title of oecumenical or universal patriarchs, then the bishops of Rome pretended they had a right to the primacy as successors to the apostle Peter; and at length they were not satisfied with their supremacy in matters of religion, but arrogated to themselves the power of dispossessing princes of their kingdoms. Gregory VII. laid the foundation of this claim, a man, whose ambition, it has been well said, was scarcely to be satisfied by the possession of a world. The other bishops were not all equal in power, but he who dwelt in the metropolis took the lead of the other bishops in that province. At first he was called metropolitan, and in the eighth century he took the name of archbishop. The most eminent of these metropolitans were those of Rome, Constantinople, Antioch, and Alexandria, because these were the principal cities of the Roman empire. And next to these, on account of the supposed sanctity of his city, was the bishop of Jerusalem. The others vigorously defended their privileges against the bishop of Rome, and the controversies that arose thereupon, gave occasion at length to the schism between the Greek and Roman churches, to which we have had occasion to refer.

The see of Rome maintained its authority without much interruption till the 14th century, when it began to totter, on account of the schisms that arose among the Roman pontiffs, which lasted nearly half a century, there being two popes at a time, the one at Rome, the other at Avignon. But this schism being terminated the popes recovered their former strength. It was about this same period that Nicholas Gabrini di Rienzi, (see GABRINI,) without rank, without money, without friends, alliances or military force, led on by ambition, and supported by his eloquence alone, obtained for a short time the sovereignty of Rome; and though he could not, as he proposed, make her the mistress of the world, he, however, protected some, and awed other sovereigns, and was admitted an arbiter of kingdoms.

In the fifteenth century the pontiff's authority was again shaken, as well by disputes between the emperor and the popes, three of whom were deposed by the council of Constance, two others by the council of Pisa, and one by the council of Basil, as by the intrepidity of a second Gabrini, in the character of Stephen Porcario, of whom, his name having escaped us in the alphabetical order, we shall say a few words. He was of noble birth; his reputation was spotless; his tongue was armed with eloquence; his mind was enlightened with learning; and he aspired to free his country and immortalize his name by the glory of his deeds.

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deeds. "The dominion of priests," says Gibbon, "is most odious to a liberal spirit." Petrarch was now the oracle of the Italians, and as often as Porcaro revolved the ode, which describes the patriot and hero of Rome, he applied to himself the visions of the prophetic bard. His first trial of the people's feelings was at the funeral of Eugenius IV. In an elaborate speech he called the Romans to liberty and arms. For this act he had, by the existing laws of the state, forfeited his life; but the benevolence of the new pontiff, who viewed his character with pity and esteem, attempted by an honourable office to convert the patriot into a friend. He was again guilty of the same offence, and was a second time pardoned. The humane pontiff now removed him from the scene of temptation to Bologna, with a liberal allowance for his support, and the easy obligation of presenting himself each day before the governor of the city. But he formed a party at Rome, and a new conspiracy was excited. His nephew, a daring youth, assembled a band of volunteers, and on the appointed evening a feast was prepared at his house for the friends of the republic. Their leader, who had escaped from Bologna, appeared among them in a robe of purple and gold; his voice, his countenance, his gestures, bespoke the man who had devoted his life to the glorious cause. In a studied oration, he expatiated on the motives and the means of their enterprize; the name and liberties of Rome; the sloth and pride of their ecclesiastical tyrant; the active or passive consent of their fellow citizens; three hundred soldiers and four hundred exiles, long exercised in arms or in brooding over their wrongs; the licence of revenge to edge their swords, and a million of ducats to reward their victory. "It would be easy," he said, "on the next day, the festival of Epiphany, to seize the pope and the cardinals before the doors, or at the altar, of St. Peter; to lead them in chains under the walls of St. Angelo; to extort, by the threat of instant death, a surrender of the castle; to ascend the vacant Capitol; to ring the alarm-bell, and to restore in a popular assembly the ancient republic of Rome. While he was triumphing in his own mind, he was already betrayed. The senate, with a strong guard, invested the house; the nephew of Porcaro cut his way through the crowd, but the unfortunate Stephen was drawn from a chest, lamenting that his enemies had anticipated by three hours the execution of his design. After such manifest and repeated guilt, the pope, though still inclined rather to pity than punishment, could say nothing in his favour. Porcaro, and nine of his accomplices, were hanged; and amidst the fears and invectives of the papal court, the Romans pitied, and almost applauded, these martyrs of their country. "But," says the eloquent historian of the Decline and Fall of the Roman Empire, "their applause was mute, their pity ineffectual, their liberty for ever extinct; and, if they have since risen in a vacancy of the throne or a scarcity of bread, such accidental tumults may be found in the bosom of the most abject servitude." Of the struggles of the people of Rome we have, therefore, nothing more to record.

But the independence of the nobles, which was somented by discord, survived the freedom of the commons, which must be founded in union. Rapine and oppression were long maintained by the barons of Rome; their houses were a fortress and a sanctuary: and the criminals whom they protected from the law, repaid the hospitality with the service of their swords and daggers. The private interests of the pontiffs, or their nephews, sometimes involved them in these domestic feuds. Under the reign of Sixtus IV. Rome was distracted by the battles and sieges of the rival houses; after the conflagration of his palace, the prothonotary Colonna was

tortured and beheaded; and Savelli, his captive friend, was murdered on the spot, for refusing to join in the acclamations of the victorious Urfini. But the popes no longer trembled on their throne: they had strength to command, if they had resolution to claim, the obedience of their subjects; and the strangers who observed these partial disorders, admired the easy taxes and wise administration of the ecclesiastical state.

The spiritual thunders of the Vatican depend on the force of opinion; and if that opinion be supplanted by reason or passion, the sound may idly waste itself in the air, and the helpless priest will be exposed to the brutal violence of a noble or plebeian adversary. But after their return from Avignon, the keys of St. Peter were guarded by the sword of St. Paul. Rome was commanded by an impregnable citadel; the use of cannon is a powerful engine against popular seditions; a regular force of cavalry and infantry was enlisted under the banners of the pope; his ample revenues supplied the resources of the war; and, from the extent of his domain, he could bring down upon a rebellious city an army of hostile neighbours and loyal subjects. Since the union of the duchies of Ferraro and Urbino, the ecclesiastical power extends from the Mediterranean to the Adriatic, and from the confines of Naples to the banks of the Po; and as early as the sixteenth century, the greater part of that spacious and fruitful country acknowledged the lawful claims and temporary sovereignty of the Roman pontiffs. For the successive changes that have occurred in Italy from that time to the year 1811, we refer our readers to the article ITALY, in the New Cyclopædia; and we shall, probably, by the time we come to the article STATE, *Holy Roman*, be able to give a farther account of the subject, to the general peace, we earnestly hope, of 1815.

In the mean time, we shall lay before our readers an account of Rome as it appeared in the fifteenth century to an accurate and feeling mind, and then conclude the article with some account of the present state of the city.

View of Rome in the Fifteenth Century.—In the last days of pope Eugenius IV. two of his attendants, the learned Poggio and a friend, ascended the Capitoline; reposed themselves among the ruins of columns and temples; and from that commanding spot, they viewed the wide and various prospect of desolation. The place and the object gave ample scope for moralizing on the vicissitudes of fortune, which spares neither man nor the proudest of his works, which buries empires and cities in a common grave; and it would naturally be inferred, that in proportion to her former greatness, the fall of Rome was the more awful and deplorable. The description of Poggio, who was one of the first that raised his eyes from the monuments of legendary, to those of classic superstition, is as follows:

1. Besides a bridge, an arch, a sepulchre, and the pyramid of Cestius, he could discern, of the age of the republic, a double row of vaults in the salt-office of the Capitol, which were inscribed with the name and munificence of Catullus.
2. Eleven temples were visible in some degree, from the perfect form of the Pantheon, to the three arches, and a marble column of the temple of Peace, which Vespasian erected after the civil wars of the Jewish triumph.
3. Of the number, which he rashly defines, of seven thermæ or public baths, none were sufficiently entire to represent the use and distribution of the several parts; but those of Diocletian and Antoninus Caracalla still retained the titles of the founders, and astonished the curious spectator, who, in observing their solidity and extent, the variety of marbles, the size and multitude of the columns, compared the labour and expence with the use and importance. Of the baths

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of Constantine, of Alexander, of Domitian, or rather of Titus, some vestige might yet be found. 4. The triumphal arches of Titus, Severus, and Constantine, were entire, both the structure and the inscriptions; a falling fragment was honoured with the name of Trajan; and two arches then extant, in the Flaminian way, have been ascribed to the baser memory of Faustina and Gallienus. 5. After the wonder of the Coliseum, Poggius might have overlooked a small amphitheatre of brick, most probably for the use of the Prætorian camp: the theatres of Marcellus and Pompey were occupied in a great measure by public and private buildings; and in the circus Agonalis and Maximus, little more than the situation and the form could be investigated. 6. The columns of Trajan and Antonine were still erect; but the Egyptian obelisks were broken, or buried. A profile of gods and heroes, the workmanship of art, was reduced to one equestrian figure of gilt brass, and to five marble statues, of which the most conspicuous were the two horses of Phidias and Praxiteles. 7. The two mausoleums or sepulchres of Augustus and Adrian could not totally be lost; but the former was only visible as a mound of earth; and the latter, the castle of St. Angelo, had acquired the name and appearance of a modern fortress. With the addition of some separate and nameless columns, such were the remains of the ancient city: for the marks of a more recent structure might be detected in the walls, which formed a circumference of ten miles, included three hundred and seventy-nine turrets, and opened into the country by thirteen gates.

Of the Government of Rome under the Popes.—For this part of our article we shall be chiefly indebted to the justly denominated “Classical Tour through Italy,” by the Rev. I. C. Eustace, whose partiality for whatever is papal, may render him, perhaps, somewhat partial as an historian. In speaking of this government, as it existed previously to the ravages of the French at the close of the last century, he says, though despotic above all controul, it is exercised by the pontiff with mildness, and submitted to by the people with respect. The sacred character of the bishop influences both the sovereign and the subject. The government is elective; promotion depends in a great degree upon talents and virtues; and, consequently, there is a stimulus to exertion and a scope for honourable ambition. As for the origin of the temporal sovereignty of the popes, it may be most honourably and firmly established on the consent of the people. After the expulsion of the Goths, when the arms of the Eastern emperors had re-conquered, but were incapable of protecting Italy; when the incursions and menaces of the Lombards kept the city in constant alarm, and pestilence and famine had preyed upon it; the Romans naturally turned their eyes to their bishops, and found in them the support which they had vainly solicited from their sovereigns. The pontiffs had till that period been as eminent for their virtues as for their station, and when forced by public distress to take a considerable share in the administration of the state, they displayed a prudence equal to their sanctity, and a benevolence as extensive as the possessions of the Roman church. “We see them,” says Mr. Eustace, “in the seventh, eighth, and ninth centuries, protecting Rome on one side against the attacks of the Lombards, and securing it on the other from the rapacity and treachery of the exarchs, repairing its walls, feeding its inhabitants, engaging distant princes in its interests, and finally restoring the majesty of its name in the new empire. Rome, indeed, seems to owe her existence to her pontiffs; and had not the chair of St. Peter replaced the throne of the Cæsars, and the seat of empire become the sanctuary of religion, Rome would probably

have sunk into a heap of uninhabited ruins, and left to posterity nothing more than the *whistling of a mighty name.*”

From the re-establishment of the Western empire to the tenth century, the popes employed their influence in opposing the growing power of the Saracens, and in protecting the coasts of Italy, and the capital itself, against the predatory incursions of those barbarians. Shortly after commenced their contests with the German Cæsars: but however much the popes may be censured, as ecclesiastics, in those destructive quarrels; as princes and as Romans they may claim indulgence, as they struggled against foreign influence, and finally succeeded in freeing Italy from the yoke of a German, a barbarian, and an absentee ruler. The disputes of the popes with the barons and the Roman people were founded on the just opposition of a firm government, to the arrogance and tyranny of an aristocratic body on the one side, and to the licentiousness of a turbulent populace on the other. But Rome has just cause to deplore and condemn the folly and the perversity of her pastors, when they forsook her venerable walls, and submitted to voluntary exile, alternately the instruments and victims of French intrigue and ambition. Of all the disasters that befel Rome in the long series of her eventful history, this, perhaps, was the most pernicious both in its immediate effects and distant consequences, and to it may be ascribed the degradation of the noblest monuments, the depopulation of the capital and its neighbourhood, and the evils that anarchy and tyranny never fail to bring in their train. These evils continued to operate long after their efficient causes had ceased to exist, and the popes, during many ages after their re-establishment in Rome, had to struggle with the restless and unbridled passions excited by the guilt or the folly of their absentee predecessors. Sixtus Quintus succeeded in breaking the spirit of the barons, and having brought the people to submission, he restored order, peace, and industry, to the Roman states.

From this period Rome rapidly increased in prosperity, riches, and population, and became the seat of the arts and sciences, the centre of political negotiation, and not unfrequently of courtly intrigue. Most of the succeeding popes took an active part in the public transactions of the times, sometimes as mediators, but too frequently as parties concerned, with a view to national interests, or to family aggrandizement. Their conduct, in this respect, though little conformable to the principles of their profession, was advantageous to their territories, as it brought wealth to the inhabitants, and reflected lustre on a city, at the same time the metropolis of the Christian world, and the capital of an extensive and flourishing country.

The reformation produced at the time little or no diminution of the temporal greatness and consideration of the popes: so little indeed, that in the century following that event, Rome seems to have enjoyed a splendour and prosperity not witnessed within her walls since the fall of the empire. Hence it has been observed, “that if Pyrrhus’s ambassador could with propriety call the Roman senate in his time a congress of kings, a similar appellation might with equal veracity be applied to the modern senate of Rome, the college of cardinals, during the seventeenth century. That assembly was, strictly speaking, composed of princes, the sons, nephews, brothers, or uncles of the first sovereigns in Europe; men who not unfrequently, as statesmen and ministers, had held the reins of empire at home, or as ambassadors, represented their royal relatives abroad. They either generally resided or frequently assembled at Rome, not only to discharge their duties about the person of the pontiff,

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tiff, but to support the interests of their respective courts; and in order to attain this object the more effectually, they displayed a splendour and a magnificence nearly royal. The officers of their household were often nobles of high rank; their secretaries and chaplains were men of talents and business; a long train of guards, servants, and retainers, attended their persons when they appeared in public, and the blaze of the purple, in itself so dazzling, was heightened by all the adventitious circumstances of birth, power, and opulence. The union of so many illustrious personages, vying with each other in talents and magnificence, gave Rome the appearance of an universal court, where all the sovereigns of Europe were assembled to discuss the general interests of Christendom, and to display their rival glories in peace and security."

From this epoch the character of the pontiffs became more episcopal and pacific, and they have chiefly been occupied with the government of the Catholic church over which they preside, and with the civil administration of their own territories, which, as we have seen, are sufficiently extensive to engross their utmost attention. The arts and sciences have at all times, but particularly in the latter centuries, met with special encouragement from the popes; and Rome, enlivened by their constant presence, embellished by their munificence, and fed by the produce of several extensive, populous, and well-cultivated provinces, had gradually resumed her robes of glory, and began to promise herself once more the return of her former dignity and prosperity. "She had," says Mr. Eutace, "been great even in her fall, and venerable in her disfalls. She had ceased to be the mistress of the world in arms, but she still remained the mistress of the world in arts; she was no longer the capital, but she was the metropolis of Europe; not the residence of the first sovereign, but the see of the first pastor. She had not been subjected to slavery as Athens; she had not been reduced to a heap of ruins, as Babylon. She still reigned widowed, but independent; and still claimed and enjoyed the veneration of kings and of nations. Without fleets or armies she reposed in fearless tranquillity: public reverence, more mighty than military power, covered her head with an invisible ægis, guarded her frontiers, and secured her repose. Even the nations which had forsaken her communion, and in days of irritation had defied the thunders of her fulminating pontiffs, now looked towards her with respect, and beheld with affection and reverence the benevolence, the sanctity, and the humility of her pastors. Such was the state of Rome during the eighteenth century; a state happy in the enjoyment of peace, plenty, and increasing improvement, and big with the hopes of future and accumulating prosperity. The French invasion closed the scene. See ITALY.

Of the Present State of Rome.—The modern city possesses many features of ancient Rome. The same roads lead to her gates—the same aqueducts pour the same streams into her fountains—the same great churches that received the masters of the world under the emperors, are still open to their descendants—the same venerable walls that inclosed so many temples and palaces in the reign of Aurelian, still exist. Modern Rome lies extended principally on the plain, and is scattered thinly over the hills, bordered by villas, gardens, and vineyards. Its population is supposed to amount to 200,000 souls. The streets are well built and paved, narrower, in general, than those in London, and wider than those in Paris: the houses being low, the streets are light and airy: they are many of them very long and straight, and not unfrequently terminated by an obelisk, a fountain, or a church. The houses are of stone, but plas-

tered or stuccoed, as at Vienna, Berlin, &c. This city contains 46 squares, 5 monumental pillars, 10 obelisks, 13 fountains, 22 mausoleums, 150 palaces, and 346 churches.

Of the squares, the most remarkable is the Piazza Navona, which gradually rose on the ruins of the Circus Agonalis. It is adorned by the handsome church of St. Agnes, and refreshed by three fountains decorated with statues. One of these fountains is an object of great admiration, and is thus described. Four figures, representing four rivers, recline on a craggy rock: on its top stands an Egyptian obelisk; from its hollow sides rushes a perpetual stream. These three fountains are so managed during the heats of August, as to inundate the whole square on Saturdays and Sundays, and afford a very refreshing exhibition to the Roman gentry, who parade along in their carriages, and to the common people, who always collect in crowds to behold the enlivening scene. Modern Rome is ten miles in circumference, but this extent comprehends gardens and uninhabited places, and it is defended by the castle of St. Angelo. In the Rione di Monte is the church of St. Giovanni in Laterano, dedicated to St. John in the seventh century, and raised on the ruins of a palace built by Constantine, in the year 324. Near this church is the baptistery of Constantine, celebrated for its ornaments, its antiquities, paintings, columns, and statues. Before the church is an obelisk, constructed at Thebes, in Upper Egypt, and brought down the Nile to Alexandria, from whence, by order of Constantine, it was conveyed to Rome. The church of St. Stephen, found also in this part of Rome, called the *round*, from its form, is an ancient temple of Faunus; it is supported by sixty pillars of granite or marble of the island of Paros. The church of the holy cross of Jerusalem was built by Constantine, and is celebrated for its relics, its columns, and its paintings. The ruins of a temple, dedicated to Venus and Cupid: the monastery of St. Eusebius, built on the ruins of the baths and palace of Gordianus: Trajan's pillar, one of the most beautiful monuments of ancient Rome: the remains of the baths of Titus, of temples dedicated to Concord, to Peace, to Jupiter Tonans, to Jupiter Stator, with many other churches, palaces, and monuments of antiquity, are to be found in this quarter of Rome.

In the Rione di Trevi is found the church of the Twelve Apostles, first built in the reign of Constantine, and rebuilt by Clement XI. This ward likewise contains a church, dedicated to our Lady of Loretto, adorned with Corinthian pillars and the most beautiful statues; the church of St. Mary in Trivio, built or repaired by Belisarius; the churches of St. Vincent, of Anastasio, and many superb palaces. The Rione di Colonna contains, besides churches, the Piazza di Colonna, of which the buildings are handsome: in this square is a fountain, and a marble column of Antoninus, constructed in the time of Commodus, and all of marble: in this ward is the great hall of Justice; the house of the missionaries, whither all ecclesiastics of Rome retire for ten days before they receive holy orders, with several palaces and monuments of antiquity. The Rione di Campo di Marzo contains the ancient Campus Martius; in this are found several beautiful churches and magnificent palaces; among other buildings is the Clementine college, founded by pope Clement VIII. The Rione di Ponte takes its name from the bridge of St. Angelo; in it are found a college for one hundred students, Hungarians and Germans. The Rione della Regola, near the Tiber, contains the Farnese palace, in which is seen the celebrated colossal statue of Hercules, and many others: this palace was built by Michael Angelo, with the stone taken from Vespasian's amphitheatre;

theatre; the gallery was painted by Hannibal Caracci; and the Monte della Pietà, established in the year 1539, for the purpose of lending money on pledges without interest. The Rione di St. Eustachio contains the beautiful church of St. Charles aux Catinari, in which, among many others, is a beautiful picture representing the death of St. Anne; the church of St. Andre de la Valle, which contains some excellent paintings; the college de Sapienza is, perhaps, the most celebrated in the universe; this magnificent building was begun under Leo X. from the design of Michael Angelo; the palace of Justiniani, adorned with a great number of bas reliefs, and antique statues; many of them found on the spot on which were the baths of Nero, and the palace is now erected: the Theatre d'Argentina, and many other palaces, antiquities, and churches. The Rione della Pigna contains the Piazza della Rotondo, in which is a beautiful fountain of white marble, ornamented with an obelisk and dolphins, which spout out the water. The Roman college is a vast and superb edifice, built in the time of Gregory XIV. for the study of the languages and sciences; here is kept the museum of father Kircher, and the library is well furnished: the church of St. Maria della Sopra Minerva, so called from a temple of Minerva which anciently stood there. The ward of the Rione di Campitelli, or Du Capitoie, contains the Capitolinus mountain, the Palatine, and part of mount Cælius; the church of St. Mary in Campitelli, rebuilt in the year 1656, by the people of Rome. Here are found many beautiful statues and pictures, by the most celebrated masters; the Tarpeian rock, now called Monte Caprino; the remains of the temple of Jupiter Tonans; and the church of St. Peter in Carcere; part of the prison constructed by Ancus Martius; the ruins of a temple of Concord; the church of our Lady of Consolation; the church of St. Sebastian, built in the ancient Hippodrome. In this ward is found likewise the Coliseum, a superb building, constructed at the command of Vespasian, by the Jews brought from Jerusalem, and destined for the combats of gladiators and public spectacles. In the Rione di St. Angelo is the church of St. Angelo, which gives name to the ward, was built in the eighth century; near it is the theatre of Marcellus, built by Augustus, and capable of holding 30,000 spectators; the palace of Savelli, and the palace of Mattei, celebrated for the pictures and statues which they contain; and many others. The ward of the Rione di Ripa, on the side of the river, includes the Aventine mountain, and the island of St. Bartholomew, inhabited at the time of the expulsion of the Tarquins, and then called Tiberina and Lycania; the church of St. Bartholomew was founded on the ruins of an ancient temple of Esculapius. This island is joined to the rest of the city by two bridges. The church of St. Nicholas in Carcere is built near the common prison; St. George in Valebro; the arches of Septimius Severus and Janus; St. Mary in Cosmedin, built by the earliest Christians, on the ruins of a temple of Modesty; St. Paul without the walls is a patriarchal church, and, next to St. Peter, one of the largest in Rome, built by Constantine; the immense ruins of the baths of Caracalla, in which it is said 3000 persons might bathe at one time; the grand circus; the tomb of Cælius; the catacombs or vaults dug in the stone or solid earth, and used for depositing of the dead in this ward. The Rione di Transtevere is on the other side of the Tiber, and includes the mountain Janiculus; in the church of St. Peter in Montorio is the celebrated picture of the Transfiguration, by Raphael, by some thought to be the most perfect painting that exists; the baths of Severus; the Naumachium of Augustus; and the temple of Fortune. The Rione di Borgo, or Rione del

Vatican; this, too, is beyond the Tiber, and is joined to the rest of the city by means of the bridge of St. Angelo, anciently Pons Cælius; in it is the castle of St. Angelo, anciently called Moles Adriani, from its founder; it is circular, and exceedingly strong: here the papal crown is kept, and prisoners of state are confined; it communicates with the Vatican by a long covered gallery. The church of St. Peter is the chef-d'œuvre of Italy, the largest and most beautiful church in the world. It was projected by Nicholas V.; Julius II. laid the first stone in the year 1506; but the whole building was not finished till the next century: it is said to cover 20 acres, and to have cost upwards of one million sterling. The original artist was Bramante, but the greater part was from the plan of Michael Angelo, who raised the cupola; Maderni finished it in the year 1621. The pavilion of the great altar of this church, and the four wreathed pillars of Corinthian brass which support it, were formed out of the spoils of the Pantheon. The Pantheon, originally dedicated to the honour of all the gods, is now a Christian temple, and is still the most perfect of the Roman temples that now remain, and notwithstanding the depredations it has sustained from Goths, Vandals, and Popes, is still a beautiful monument of Roman taste.

The pope has three fine palaces, of which the principal is the VATICAN, which see. The library of this palace is the largest and most complete in the world, rich, especially in manuscripts, in all languages, and all ages. In Rome, the lover of the fine arts will, after all the depredations of the French, meet with innumerable paintings by the most celebrated masters in the world, and with the finest works of sculpture. Besides the university, which consists of several noble colleges, there are numerous academies and literary societies.

The relative situation of Rome, with regard to other European capitals, is as follows: it is 380 miles from Vienna, 560 from Paris, 740 from Amsterdam, 810 from London, and 900 from Madrid. It stands within 10 miles of the Tuscan sea. Universal History. Holberg's Introduction. Tytler's Elements of General History. Playfair's Chronology. Gibbon's History of the Rise, &c. Encyclopédie Méthodique. Eustace's Classical Tour, 2d edition.

ROME, *Citizen of*, at first, was only a citizen of Rome: at length, the right of citizenship was given to other cities and people, both in Italy and the provinces. It was thus St. Paul was a Roman citizen, Acts, xvi. 21. 37, 38. xxii. 25, 26, 27. xxiii. 26; the city of Tarsus, in Cilicia, a native of which he was, having the right of Roman citizens. See MUNICIPAL Cities, and PAUL.

ROME DE L'ISLE, JOHN BAPTIST LOUIS, in *Biography*, was born, in 1736, at Gray, in Franche-Comté. He applied himself, from a very early period, with earnestness to the study of natural history and mineralogy; and by his discoveries and writings he acquired a considerable reputation. In 1766 he published "A Letter to M. Bertrand on Fresh-Water Polypes." He drew up descriptive catalogues of many rich collections of minerals and madrepores, of which the most distinguished was that of Davila, in 3 vols. 8vo. 1767. In 1779 and 1781 he published a work, entitled "L'Action de Feu central banni de la Surface du Globe, et le Soleil retabli dans ses Droits." In 1783 he published that work by which he is best known, entitled "Chrétiologie ou Description des Formes propres à tous les Corps du Regne minerale," 4 vols. In this elaborate performance, the author gives a description of the forms proper to every substance of the mineral kingdom, in a saline, stony, and metallic combination; with figures of all the known crystals, arranged according to the number and disposition

position of their angles. He asserts, which is generally admitted, that every species in the mineral kingdom always takes a polyhedral form, which is regular, constant, and peculiar to itself. Besides the works already mentioned, he published "Caractères extérieurs des Minéraux," 8vo. 1784; and "Metrologie ou Tables pour servir à l'Intelligence des Poids et des Mesures des Anciens d'après leur Rapport avec les Poids et les Mesures de la France," 8vo. 1789. This philosopher died at Paris, in 1790.

ROMÉ, in *Geography*, a town of Brasil, in the government of Goyas; 85 miles E. of Villa Boa.

ROME, a post-town of America, in the county of Oneida, and state of New York, situated on the Mohawk river; 8 miles W. of Whitestown. This town was taken from Stauban, and incorporated in 1796. N. lat. $43^{\circ} 12'$. W. long. $75^{\circ} 30'$.

ROME *du Tarn*, *St.*, a town of France, in the department of the Aveyron, on the Tarn; 4 miles N. of St. Afrique.

ROME *Scot.* } See PETER-Pence.
ROME *Peny.* }

ROMELIA, in *Geography*. See ROMANIA.

ROMELSO, a cluster of small islands on the west side of the gulf of Bothnia. N. lat. $64^{\circ} 55'$. E. long. 21° .

ROMENAY, a town of France, in the department of the Saone and Loire; 15 miles N.N.E. of Macon.

ROMENO, a town of the county of Tyrol; 13 miles S.W. of Bolzano.

ROMERSBERG, a mountain of Bavaria, in the principality of Aichstatt; 5 miles W. of Aichstatt.

ROMERSGEHAG, a town of Germany, in the bishopric of Fulda; 14 miles S. of Fulda.

ROMERSTADT, or ROMAROW, a town of Moravia, in the circle of Olmutz, near which are some iron mines; 20 miles E.N.E. of Olmutz. N. lat. $49^{\circ} 50'$. E. long. $17^{\circ} 9'$.

ROMESCAMPS, a town of France, in the department of the Oise; 6 miles N.W. of Grand Villiers.

ROMETTA, a town of Sicily, in the valley of Demona; 5 miles N.W. of Messina.

ROMFORD, a market-town and parish in the liberty of Havering-atté-Bower, county of Essex, England, is situated at the distance of 17 miles S.W. from the county town of Chelmsford, and 12 miles E.N.E. from London. This town is supposed by Stukeley to occupy the site of the Roman station Durolitum. The same author conjectures that its present name is a contraction for Romanford; and in this opinion he is supported by Mr. Lethieullier. Lysons, however, derives it from the Saxon words *Rom* and *Ford*, which signify the Broad-Ford, in allusion to an ancient passage through a rivulet which flows past the western extremity of the town. Romford is first mentioned in record in the Red Book of the Exchequer; where it is said that, in 1166, Roger Bigod, duke of Norfolk, held "the wood of Romford by feoffee, and payment of five shillings a-year." It is next noticed in 1277, at which time the manor formed part of the possessions of Adam de Cretinge. It afterwards passed to Thomas de Brotherton, earl of Norfolk, from whom it descended by marriage to the Mowbrays, dukes of Norfolk; but on the death of John, the fourth duke, without male issue, in 1477, it became vested in James, lord Berkeley. Since that period it has belonged to different families, and is now the property of a gentleman named Newnan.

Romford is governed by a bailiff and wardens, who, though forming no corporation, are empowered by letters patent to hold a weekly court, for the trial of all causes, whether civil or criminal, high treason not excepted. In

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ecclesiastical jurisdiction, however, it is subordinate to Hornchurch, except so far as concerns the maintenance of the poor; in which particular it was recognised as a separate parish, in the year 1786. The privilege of holding a weekly market was first granted to the inhabitants by king Henry III.; but at present here are three: one on Monday, for the sale of calves; another on Tuesday, for hogs; and a third on Wednesday, for corn and cattle. There is likewise an annual fair on the 24th of June. The church or chapel of Romford is an ancient structure, and was probably erected about the commencement of the 15th century, when the inhabitants obtained a bull from the pope, authorising them to consecrate a cemetery adjoining the town, for the burial of their dead, who had, previously to that time, been carried to Hornchurch burying-ground. In this chapel were, in Catholic times, a guild and a chantry; the former of which was valued at *4l. 10s. 2d.*, and the latter at *13l.* annual revenue, at the era of the dissolution. The principal monuments here are those of sir George Hervey, knight, lieutenant of the Tower, who died in 1605, and his lady, both of whom are represented kneeling; and of sir Anthony Cook of Gidea-Hall, and his lady, whose effigies are exhibited in similar positions. On the latter tomb are several inscriptions in Latin, said to have been written by the daughters of the deceased, who were the most learned females of the age. Not far from the church is a charity-school for forty boys, and another for twenty girls, which were founded and endowed in 1728; and at a short distance from the western end of the town are barracks for the accommodation of a regiment of cavalry, erected in 1795. According to the population census of 1811, the parish of Romford, including the Town ward, Collier-row ward, Harold's-wood ward, and Noah-hill ward, contains 620 houses, and 3244 inhabitants.

The district called Havering-atté ward, which comprehends the three adjacent parishes of Hornchurch, Romford, and Havering, anciently constituted part of the demesnes of Saxon kings; and even to this day it possesses peculiar privileges, both as prescriptive rights, and by charter, granted by Henry IV., and since confirmed by several of his successors. Near the village of Havering-atté-Bower was formerly a palace, which tradition ascribes to king Edward the Confessor, and which subsequently became the occasional residence of more than one monarch of the Norman line. The situation of this palace is very fine, and commands extensive views over parts of Essex, Hertfordshire, Kent, Middlesex, and Surrey, as well as of the river Thames. The surrounding park, now the property of the crown, but let on lease, exceeds a thousand acres in extent. To the westward of this park, about two miles, lies Hainault-Forest, in which is a very remarkable tree, called Fairlop-oak, which Gilpin informs us, in his "Remarks on Forest Scenery," is traced by tradition "half way up the Christian era." It is generally said to be the largest tree in this kingdom, measuring 36 feet in girth near the base or root, and spreading its branches over a circumference of 300 feet. At Hempstead, in Essex, is a tree of much larger dimensions. Round the Fairlop-oak, on the first Friday in July, is held an annual fair, which appears to have originated from a gentleman, named Day, who commenced the practice of dining with his friends annually under its shade.

About a mile to the eastward of Romford is Gidea-Hall, an ancient seat of the Cook family; and near it stands Hare-Hall, a mansion formerly belonging to John Arnold Wallenger, esq. The house was built under the direction of Mr. Payne, in 1769, and is constructed of Portland

stone; it consists of a centre, with two wings, connected by colonnades. A small villa in this neighbourhood, at Hare-street, is the residence of Humphrey Repton, esq., distinguished for his taste and talents as a landscape-gardener. He is also author of two or three elegant volumes on picturesque scenery, and the principles of taste, as displayed in the embellishment of parks and gentlemen's mansions. His son, John Adey Repton, is also justly celebrated for his intimate knowledge of the principles and history of the ancient architecture of England. Four miles to the eastward is the village of Brentwood, or Burnt-wood, which was anciently a market-town; but this privilege is now lost. Its former importance, however, may be conjectured from the fact of the county assizes having been held here for many years. The remains of the town-hall and prison are still discernible in the main street, which stretches itself along the Harwich road, and abounds with inns and public houses for the accommodation of travellers. Here is a grammar-school, founded in 1537 by sir Anthony Brown. Camden supposed the Roman station of Cæsaromagus to have been situated at or near Brentwood; but this opinion is not supported by any facts, or even probability.

Five miles westward from Romford is Wantstead-House, the seat of William Pole Tilney Long Wellesley, esq., M.P., who acquired it by marriage with Miss Tilney Long, eldest daughter and co-heiress of the late sir James Tilney Long. It is a very spacious and magnificent building, measuring 260 feet in front, and nearly 80 feet in depth. In the centre of the principal front is a grand portico, supported on six Corinthian columns, and having on each side a flight of steps, and in the tympanum the arms of the Tilney family, finely sculptured. The house is divided into two stories, the uppermost of which contains the ball-room and principal apartments. Several of the rooms contain a collection of fine paintings by eminent artists. The gardens and pleasure-grounds were laid out by Richard Child, previously to the erection of the house; but latterly great alterations and improvements have been made in the former, under the direction of Mr. Repton, who has very properly revived part of an old and almost exploded fashion, in decorating the lawn immediately adjoining the house with flowers, beautiful shrubs, &c. to regale and "delight the senses of seeing and smelling." At the splendid mansion of Longleat, Wiltshire, this has been adopted on a large scale, and with singular beauty. (See WARMINSTER.) Opposite the back front is an easy ascent, through an agreeable villa, to the river Roding, which is formed into canals, and has near it a curious grotto, constructed by the second earl Tilney, at an expense of 2000*l.*, exclusive of its costly materials. Within the park, on its southern side, a tessellated Roman pavement was discovered in the year 1735. It was about 20 feet long, and was conjectured by Mr. Lethieullier to have been the pavement of a banquetting-room. In the centre was the figure of a man, and around him a great variety of ornaments. The History and Antiquities of the County of Essex, by Philip Morant, M.A., 2 vols. folio, Lond. 1767. Lysons's Environs of London, 4to. 1796. Beauties of England and Wales, vol. v. by John Britton and E. W. Brayley, 8vo. Lond. 1803.

ROMHILD, a town of Germany, in the county of Henneberg; eight miles S.E. of Meinungen. N. lat. 50° 26'. E. long. 10° 42'.

ROMI, a town of Asiatic Turkey, in the province of Diarbekir; 45 miles S. of Kerkisich.

ROMIEU, M. of Montpellier, in *Biography*, published in 1743 and 1751, what he called "A New Discovery of

the grave Harmonics," meaning the third sound, resulting from the coincident vibrations of two acute simultaneous sounds; a phenomenon which Tartini had discovered in 1714, and upon which he afterwards built his system, or "Trattato di Musica," published in 1754.

This discovery of Tartini excited the envy, not only of Romieu, but of d'Alembert, Serre of Geneva, the abbé Roussier, Laborde, &c. The first attempt was to rob him of the honour of the *discovery*, and then to depreciate his explanations, and the *consequences* which he derived from the phenomenon. But it appears to us, on the most careful and minute enquiry, that they have egregiously failed in both. With respect to his *discovery*, Tartini himself, and his zealous disciple count Taxis, of Venice, have clearly authenticated his title to it. (Risposta di Tartini alla critica del di lui Tratt. di Mus. Ven. 1767—et Risposta di un Anonimo al Sig^r. Rousseau circa al suo sentimento in proposito d'alcune propof. del Giuf. Tartini, Ven. 1769.)

And the long extracts given from Romieu's laboured memoir on the subject of his discovery of the *terzo suono*, by Laborde, in his "Essai sur la Musique," have so much puzzled the cause, that he may be truly said to "explain the thing till all men doubt it," &c.

Tartini himself, by his notation of each *third sound*, produced, as is supposed, by the coincident vibrations of any two simultaneous intervals, is clear and evident. Stillingfleet's commentary of Tartini's "Trattato di Musica," and Rousseau's analysis of his system, do justice to his ingenuity and profound harmonical knowledge, without concealing his defects.

Perhaps we have no right to imagine ourselves unprejudiced in this discussion; having been so long accustomed to regard Tartini as a great practical musician, and an exquisite composer, we may have been insensibly inclined to respect his theory, and, indeed, whatever he has produced; for what more can science do for any musician in the practice of his art, than it has done for Tartini? Has it taught his mathematical opponents, of the old French school, to compose elegant, graceful, spirited, or fanciful music? or even informed them in what good music consists? See TARTINI and TERZO SUONO.

ROMIEU, *La*, in *Geography*, a town of France, in the department of the Gers; five miles E. of Condom.

ROMILLY, a town of France, in the department of the Aube, and chief place of a canton, in the district of Nogent sur Seine; nine miles E.N.E. of it. The place contains 2175, and the canton 6888 inhabitants, on a territory of 267½ kilometres, in 15 communes.

ROMISHORN, a town of Switzerland, in the canton of Zurich; nine miles E.S.E. of Constance.

ROMKALA, a town of Asiatic Turkey, in the government of Marasch, on the right bank of the Euphrates, where the river Simeren joins it. This town has a castle, much ruined, which was the work of the Greek emperors, and which is situated at the N. end of a chain of mountains over the river. It stands on a path, separated from the mountains, to the south, by a deep fosse cut in the rock, and originally intended, as it is said, to be made so deep that it might be supplied with water by the river Simeren, and thus the place be insulated. On the W. side is the ascent, having four terraces cut in the rock, and situated above one another, each having a gate-way, and connected by steps. In the castle are two churches; 50 miles N. of Aleppo. N. lat. 36° 35'. E. long. 37° 45'.

ROMKERA, a town of Hindoostan, in Visiapour; 28 miles N.E. of Poonah.

ROMKINT,

ROMKINT, a town of Asia, in the country of Karahm : 230 miles N.W. of Samarcand.

ROMMEN, a town of Prussia, in the palatinate of Culm; eight miles S.E. of Lautenburg.

ROMMENDAL, a town of Norway; 24 miles N. of Berga.

ROMNA, a town of Russia, in the government of Tchernigov; 88 miles N.E. of Tchernigov. N. lat. 50° 36'. E. long. 33° 24'.

ROMNEY, GEORGE, in *Biography*. was born at Dalton, in Lancashire, in December 1734. His father was a native of the same place, where, upon a small patrimonial estate, he followed the threefold occupation of merchant, builder, and farmer; but as his family was large, the joint profits of his triple concerns barely afforded the means for its maintenance. At the age of 12, George was taken from the village school, where he had imbibed the rudiments of learning, and engaged by his father to superintend the workmen. He employed his leisure hours in carving, and being fond of music, made a violin for himself, which he preserved till his death.

He was first tempted to draw, from seeing some ordinary prints in a periodical magazine, which he imitated with considerable success; and his first attempt at drawing a portrait was from memory, when endeavouring to describe the features of a stranger whom he had seen at church. When he was about 15, his mind was led astray from the occupations in which his father had engaged him, by the society and conversation of a peculiar, but ingenious man, named Wilkinon, who resided at Dalton. He was afterwards placed under the care of a Mr. Wright, a cabinet-maker at Lancaster; but he, soon perceiving the turn of Romney's mind for drawing, advised his father to leave him at liberty to indulge his propensity, and become a painter. At the same time he recommended an artist of the name of Steele, as a preceptor for the youth; and with him he continued to study and practise for a short time only, in which, however, he acquired, to a certain extent, the knowledge and use of the materials of the art.

When he left Steele, and had begun to practise portrait painting as a means of subsistence, he became anxious to visit, and tempt his fate in the metropolis. He laboured therefore very hard, painting portraits at low prices, and occasionally producing pictures of historical subjects, which he disposed of by way of raffle at Lancaster. By these means he acquired a sum of nearly a hundred guineas; of which taking thirty pounds to pay his travelling expences, and leaving the remainder with his wife, he set out to put his long intended project into execution, in the year 1762.

He first resided in the city, where he painted portraits at five guineas a head, and acquired considerable practice through the friendly assistance of Mr. Braithwaite, then of the post-office. In 1764 he visited France, in company with Mr. Greene, of Gray's Inn. There he was introduced to Vernet, and, by his friendly assistance, obtained admittance to the gallery of the duke of Orleans, the Luxembourg, and other repositories of art. On his return, he took up a residence in Gray's Inn, to be near his travelling companion; and, by a picture of judge Yates, obtained favour among gentlemen of the robe, and afterwards produced many excellent pictures of persons eminent in that profession. In 1765 he obtained a prize from the Society for the Encouragement of Arts and Sciences, for an historical picture, the subject of which was the death of king Edmund. In 1768 he quitted Gray's Inn, and went to live in Great Newport-street, where he continued to advance in reputa-

tion and practice; exhibiting with the incorporated society of artists in Pall Mall, and in Spring Gardens.

Though thus rapidly gaining public respect as an artist, Romney was himself so conscious of his want of style, and the necessity of cultivating his taste by seeing the great models of antiquity, that he nobly resolved upon relinquishing, for a time, the pecuniary advantages his talents acquired him, (which now amounted to 1200*l.* a-year,) and visit Italy, where alone he could, at that time, attain the object of his desire. He accordingly arranged a plan of travel with Mr. Ozias Humphrey, a miniature painter of celebrity, and on the 20th March 1773, they set forward on their journey, through France, to Rome. There, and at other places, where the best works of art were to be found, he remained two years; leading a life recluse and studious, and making some few copies.

On his return, in July 1775, he took the house in Cavendish-square, where he resided till he retired, in 1798, from public practice, to live at Hampstead, in a house he had built; and where he hoped to recruit a weakened constitution by tranquil enjoyment, and the beneficial effects of purer air. During the preceding 20 years, Romney had enjoyed uninterrupted success in the practice of his profession, to which he was so ardently attached, that his whole delight was in it. His talents, in return, were highly esteemed, and encouraged by an immense influx of employment. He, in measure, divided the attention of the town with Reynolds, and indeed by numbers was preferred before him; but he wanted the suavity of mind and manners which his accomplished rival enjoyed. Timid and reserved, and, at the same time, ardent and enterprising, his imagination was tremblingly alive to those irritating circumstances, by which vulgarity and ignorance constantly wound the mind of the portrait painter, and subject him to mortification and disgust. The slightest appearance of coldness in a friend, or of hostility in a critic, was often sufficient to obstruct the exertions of his faculties. This timidity and reserve were the reasons that, amidst the immense crowd of persons to whom, of course, by his professional practice, he was known, there were few with whom he lived in friendly intercourse. His mind dwelt constantly on the art he delighted and excelled in, and among those only who sympathized with his peculiarities, was he happy to associate.

Romney was subject to occasional depression of spirits, which the kind attentions of his friend Hayley, and the invigorating air of the Sussex Downs, among which that friend resided, and where our painter usually spent his summer months, often partially removed. On the approach of age, he was less able to cope effectually with attacks of that nature, and they gained strength upon him to an alarming degree. In 1797 he felt a slight paralytic stroke, which affected his eye and his hand, and prevented him from continuing his professional labours. He then retired, as we have said, to Hampstead, but finding his health still decline, he, in 1799, revisited his native country; and at Kendal received from a wife, whom, though deserted for so long a space of time, he had supported, and protected from poverty, a kind and affectionate attention till his death, (which occurred in Nov. 1802,) having unbappily survived the loss of that faculty which is the distinguishing glory of man, and relapsed to the helpless state of infancy.

Of Romney, as an artist, it is by no means easy to appreciate the just character. That he possessed genius and talents in an eminent degree, no one can deny. The learned editor of Pilkington's Dictionary has said, "that he was made for the times, and the times for him." It had perhaps been more just to have observed, that Romney was made for bet-

ter times than those in which he lived. His perception of art was far purer than most of his contemporaries, at least in this country, were capable of enjoying; and it must be remembered, that no one ever set forth in the career of an artist under greater disadvantages than he did. The taste he imbibed for simplicity and grandeur, on seeing, at an advanced period of his life, the works of the ancient artists, prove what might have been fairly expected of him, had he happily been born under more favourable circumstances; and early initiated, under good instructors, in the mysteries of the art he cultivated with so much success without those aids. Till the time he was twenty-two he had seen no better painting than the sign of a public house, in the place where he was born; but to his active, enterprising spirit, all nature was a school; and at an age when others are employed in laying by stores of ideas from books, and thence forming regulations to guide their future progress in art, he was industriously observing and reflecting upon the grand scenery around him, and the various characters of the objects among which he lived. Thus, the little learning he had imbibed from the few literary works he had seen was called into immediate action, and his progress in real knowledge became equal to what is usually obtained in the ordinary way, with greater assistance from books and masters.

The pursuit of painting, however, requires a knowledge of certain rules in the arrangement of lines; of the beauty and power of contrast in light and shade, and in form and colour; as well as of the speediest and most efficient modes of execution. This science, being the result of repeated observations upon the principles by which Nature produces her most agreeable and sublime effects, is most readily obtained, by a careful inspection of good works of art where in it is exemplified. Such advantage was not Romney's. He had to separate for himself the partial, from the general effects of nature; and the inequality with which he, in this point, met the rivalry of more fortunate artists, is too evident in most of his productions. Frequently, his *chiaroscuro* is ill conducted, and his harmony of forms and colours imperfect; even in pictures produced when enjoying the height of his intellectual power, and at the happiest period of his executive skill: at the same time they exhibit great fertility of invention, with sweetness and delicacy of sentiment.

He was happily endowed with an inquisitive mind, that delighted in science, and pursued it warmly, with the best means he had: and he possessed a versatility of genius, which is exemplified by the variety of subjects he chose for representation. Both the comic and serious impressions of the mind had charms for him. Early in life he painted two pictures from *Tristram Shandy*; one, of the arrival of Dr. Slop at Shandy-hall, after the unlucky catastrophe he met with on the road; which afforded scope for sentimental comic humour; the other from the affecting story of the death of *Le Fevre*: both of them were highly approved for truth and propriety of feeling and expression, though differing so widely in their effects upon the mind. His journey to Italy expanded his view of art: new scenes, and new sources of information, were presented to him, of which he did not neglect to avail himself. The works of fancy he produced after his return home exemplify the use he made of the two years he spent among the unrivalled productions of art he there met with. The purity and perfection of ancient sculpture appear to have made the deepest impression upon his mind: and he afterwards assiduously cherished the taste he then imbibed, by procuring a collection of casts from the best models of ancient statues, groups, basso-relievos, &c. which he would fit by

the hour to contemplate; examining their appearances under all changes of sun-shine, and common day-light; and with lamps, prepared on purpose, he would try their effects in various modes of illumination, with rapturous delight. Hence, grandeur and simplicity became the principal objects of his ambition; he perceived these qualities distinctly, and employed them judiciously; even whilst imitating nature in his most usual occupation,—portrait painting. To present his figure, or tell his story, with simple undisturbed effect, rejecting all unnecessary minutiae, was the point he aimed at and obtained.

On his return from the continent, his zeal for historical painting revived, or rather became strengthened. In several epistles to Mr. Hayley, he laments his confinement to portraits: in one he says, "this cursed portrait painting, how I am shackled with it! I am determined to live frugally, and cut it short as soon as I can." In another, he mentions his "wish to be retired, in order to compose with more effect and propriety." And whenever he returned to London from *Eightham*, the hospitable retreat of his admiring correspondent and friend, whose playfulness of fancy was a constant and useful stimulus to Romney's dejected and desponding mind, he felt it a weight of drudgery again to fall into the trammels of portraiture: yet from the enjoyment he by nature found in the practice of his profession, a short time inured him afresh to it, and still he felt pleasure in tracing the features of each new face that presented itself; till again his exhausted frame required the exhilaration of retirement, and the refreshment afforded by pure uncontaminated air, free from the gross vapours that hover in the region of a great and populous city. It is not a little surprising, that amidst his continual labours in that branch of the art he more immediately professed, he should have found time to produce so great a number of fancy pictures as he left behind him. He also frequently spent his evenings in making large cartoons in charcoal, of subjects which suited his fancy;—generally of a sublime cast. Amongst these, was one of the dream of *Attoffa*, from the Persian of *Æschylus*, which was conducted with the taste and feeling of the ancient Greek artists.

He was in general fortunate in the choice of his historical subjects; and certainly, in this respect, had far the advantage of his great rival, *sir Joshua Reynolds*: and no less so in the power of expression, which he scarcely ever failed to obtain: whilst the latter, in his historical pictures, has rarely been so happy. *Reynolds* gave beauty and grace to his figures: Romney imparted soul. The former delights the eye with the harmony and richness of colour, and beauty of effect; the latter thrills and gratifies the heart with truth and force of expression, in action and countenance; wrought with more simplicity, but with less art. His picture of *Ophelia* seated upon a branch of a tree, the breaking of which threatens her destruction in the stream below, whilst the melancholy distraction visible in her lovely face accounts for her apparent insensibility to danger, is a sufficient proof of this assertion. His composition also of "*Titania and her Indian Votarefs*," in the possession of Mr. Beckford; "*Titania, Puck, and the Changeling*," at *sir John Leicester's*, and others of his works of the like playful and interesting kind, might be brought forward to support it. In portraiture, however, the justly exalted president of the Royal Academy stood alone, and Romney was not able to cope with him. In the composition of his figures, our artist exhibited the taste he had acquired by the study of the antique; and he admirably varied the characters of his heads. The arrangement of drapery which he adopted, partook largely of the same style; and being well understood, was painted with great dexterity;

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dexterity; though it must be confessed, that in form, it was not unfrequently better adapted to sculpture than to painting. His style of colouring was simple and broad. In that of his flesh he was very successful; exhibiting a great variety of complexion, with much warmth and richness. It was not always, however, that his pictures were complete in the general tone; but crude discordant colours were sometimes introduced in the back-grounds, which not being blended or broken into unison with the hue of the principal figures, interrupted the harmony of the whole. The executive part of his works was free, learned, and precise, without being trifling or minute, possessing great simplicity, and exhibiting a purity of feeling consonant with the style of his compositions. He aimed at the best of all principles in the imitation of nature, *viz.* to generalize its effects; he even carried it so far as to subject himself to the charge of negligence in the completion of his forms: but the truth of his imitation is sufficiently perfect to satisfy the minds of those who regard nature systematically, and not individually, or too minutely. In a word, every lover of art who knows how to appreciate truly what is most valuable in painting, will hold the name of Romney in increasing estimation, the more frequently and impartially he examines his productions.

ROMNEY, *New*, in *Geography*, one of the Cinque-ports, locally situated, partly within the liberty of Romney Marsh, partly within the level of Walland Marsh, and partly in the lower half hundred of St. Martin's Pountney, parishes of Shepway, county of Kent, England. It is distant 37 miles S.E. from Maidstone, and 71 miles S.E. by E. from London. This town is described as having risen from the ruins of Old Romney, at least a century previous to the Norman conquest. Subsequent to that event, it was bestowed by king William I. on Odo, bishop of Baieux, and earl of Kent, and was declared to be privileged as one of the Cinque-ports, having Old Romney, Lydd, Denge-marsh, and Oswardstone, and part of Promhill parish, annexed to it as members, which were to send out jointly five vessels of war, with twenty-one men and one boy to each of them. At this period, and for many years afterwards, New Romney was a very flourishing place. It was divided into twelve wards, and contained within its liberty five parish churches, a priory, and an hospital for the sick. In the reign of Edward I., however, a great part of it was destroyed by a dreadful tempest and convulsion of nature, which likewise choked up its haven, and thereby prevented its revival as a commercial and shipping town. When Henry VIII. ascended the throne, the sea had retired from it nearly two miles, and all its churches were demolished, except that of St. Nicholas, which is still standing. Henry therefore united the whole liberty into one parish, as it continues at the present day.

In very early times the Cinque-ports were enfranchised with various privileges and customs, though of what antiquity they are, or when so enfranchised, has not been determined with any certainty; they are held therefore to enjoy their privileges by prescription, though these were confirmed by Magna Charta, and since by a charter of king Edward I. New Romney, as one of these ports, is consequently a corporation by prescription; but in Edward III.'s time it was incorporated by charter, first by the style of "barons of the town and port of New Romney," and afterwards by that of "jurats and commonalty of the town and port of New Romney." Queen Elizabeth again incorporated this town, and under her charter the corporation now consists of a mayor, twelve jurats, a chamberlain, recorder, town-clerk, and twenty-six common council-men. The mayor, who is coroner by virtue of his

office, is chosen on Lady-day, yearly; and together with the jurats, who are the exclusive justices within the liberty, hold a court of general sessions of the peace and gaol delivery, and also a court of record. Romney returns two members to parliament, who are usually styled barons, and are elected by the mayor, jurats, and freemen. The first return mentioned on record, is in the forty-second year of Edward III. soon after its separate incorporation.

The town of Romney stands on elevated ground in the centre of a marshy country. It consists principally of one broad well-paved street, intersected by a second, in which the hall or brotherhood house is situated, where the mayors, jurats, and commons of the Cinque-ports, and of the two ancient towns of Rye and Winchelsea, usually keep their court, called the brotherhood; but as it is too small for the purpose, the court called the Gueffling, or Gessing, is held in the church. The market-house stands in the main street, and is a modern structure. The day on which the market is held is Saturday, weekly; besides which there is an annual fair on the 22d of August. The church of St. Nicholas is an ancient structure, and consists of three aisles and three chancels, with a square tower at its western extremity. The columns separating the aisles are massive, and support circular arches with zigzag and billeted mouldings. The west door-way under the tower is likewise formed by a circular arch, similarly ornamented. Within this edifice is a great variety of monumental erections, chiefly in memory of persons who have been mayors and jurats of the town. Anciently the church of New Romney belonged to the abbot and convent of Pontinnac, in France, who had a cell or priory here, which was suppressed by king Henry V. Here was also an hospital for lepers, founded and endowed by Adam de Cheryng in the time of king Henry II. There was likewise a house called St. John's house in this town previous to the reign of Edward IV. The only charitable institution now in the parish is an hospital and school-house for the residence of a school-master and four poor persons. According to the population census of 1811, New Romney parish contained 159 houses, and 841 inhabitants.

Old Romney is situated two miles to the westward of New Romney, of which it is a member. This place is said to have been anciently of much importance, and to have constituted one of the original Cinque-ports. Here, in the times of the Romans and of the Saxons, was a commodious haven for shipping, but the sea deserting it occasioned the decay of the town. Somner conjectures, that the Portus Lemanis of Antoninus was situated either at Old or at New Romney; but this opinion is contradicted by later antiquaries, who fix that station near Stutfal castle, at the base of Limne hill. Old Romney now consists only of about twenty houses, with a church, which is an ancient building in the massive circular style. In the north chancel is a very old tomb, with a vault underneath, but there is no inscription to identify its possessor. The font is rudely sculptured, and is supported on four stone pillars.

Romney Marsh is an extensive level of the richest pasture land in England, situated between the upland hills and the sea-shore. This district measures about ten miles in length and five in breadth. It comprehends four divisions, all under different jurisdictions and constitutions, *viz.* Romney Marsh, strictly so called; Walland Marsh; Denge-marsh, with Southbrooks; and Guildford Marsh, part of which is within Suffex. Vast flocks of sheep and herds of black cattle are pastured here. The bullocks of this Marsh are reckoned the largest in England, and the sheep equal to those of Leicestershire and Lincolnshire. So careful

were

were our ancient monarchs of this fertile district, that they granted to the inhabitants various important privileges. Edward IV. incorporated the towns of Lydd and Romney, with nineteen parishes, by the title of the bailiff, twenty-four jurats, and the commonalty of Romney Marsh; but the inhabitants exercised many privileges for several centuries anterior to that era. Under the above charter the bailiff, jurats, and commonalty, are empowered to hold a court every three weeks, and to decide on all pleas of action real and personal, civil and criminal. They are likewise empowered to choose four justices of the peace of their own, yearly, besides the bailiff, who possesses similar authority *ex officio*. They have nothing, however, to do with the superintendence or management of the embankments and drainage, which by ancient custom is vested in the lords of twenty-three neighbouring manors, who appoint a bailiff as chief supervisor of the works, who is commonly, though not always, the same person with the bailiff under king Edward's charter. The courts are held in a new hall, in Dimchurch; and at a general one holden on Whit-Thurs-day, all scots and levies, which on an average of years amount to two shillings annually, are paid. Romney Marsh is protected from encroachments of the sea by a wall of great strength, called Dimchurch wall, which extends somewhat more than three miles in length. This wall forms the only highway for carriages along its whole extent, on the road between Hithe and Romney. It measures from twelve to twenty feet in height above the level of the Marsh; and from fifteen to thirty feet in breadth at its summit. "The drainage," says Marshall, in his *Rural Economy of the Southern Counties*, "is effected by arched sluices passing under the bank; each having two pair of flood-gates, one on the outside, the other on the inside, to provide against accidents to the outer pair. These gates permit the interior waters to pass off when the tide is low; and prevent those of the sea from entering at high tide." The *History and Topographical Survey of the County of Kent*, by Edward Hafted, esq. F.R.S. and S.A. 8vo. edit. Canterbury, vol. viii. A *New Topographical, Historical, and Commercial Survey of the Cities, &c. of Kent*, by Charles Seymour, 8vo. Canterbury, 1776. *Beauties of England and Wales*, vol. viii. by E. W. Brayley, 1807.

ROMNEY, a post-town of America, the capital of Hampshire county, in Virginia, situated on the W. bank of the S.W. branch of the river Patowmac; 50 miles W. by N. from Winchester. It contains about 30 houses, a brick court-house, and a stone gaol.

ROMONT, a town of Switzerland, in the canton of Friburg, and capital of an extensive bailiwick, which was formerly a county; nine miles N.W. of Friburg.

ROMOPOCK, a town, or rather village, of Bergen county, in New Jersey, on a river of the same name, 15 or 20 miles N. of Patterfon.

ROMORANTIN, a town of France, and principal place of a district, in the department of the Loire and Cher; seven miles S.S.E. of Blois. The town contains 5730, and the canton 10,276 inhabitants, on a territory of 330 kilometres, in 10 communes. Its manufactures consist of fine cloths and serges. N. lat. 47° 22'. E. long. 1° 49'.

ROMORSWALDE, a town of Prussia, in the province of Ermeland; five miles N.N.W. of Heilsberg.

ROMPEE, or ROMPU, in *Heraldry*, is applied to ordinaries that are represented as broken; and to chevrons whose upper points are cut off. He beareth a chevron rompee, between three mullets, argent, by the name of Sault.

ROMPION, or RAMPION, in *Botany*. See CAMPANULA *Rapunculus*.

ROMPNEY, in *Geography*. See REMNEY.

ROMPONESCO, a town of Italy, on the Po; 20 miles S. of Mantua.

ROMRA, a town on the W. coast of the island of Lombeck. S. lat. 8° 15'. E. long. 115° 54'.

ROMROD, or RUMROTH, a town, with a castle, of Westphalia, in the principality of Hesse; 16 miles E. of Marburg.

ROMSDAL, a town of Norway, and capital of a district or provostship, in the diocese of Drontheim; 100 miles S.S.W. of Drontheim. N. lat. 62° 28'. E. long. 7° 54'.

ROMSDAL Bay, a bay or river of the North sea, on the coast of Norway, 20 miles long, with several branches. N. lat. 62° 40'. E. long. 7° 45'.

ROMSEY, or RUMSEY, a market-town and parish in the lower half hundred of King's Sombourne, Andover division of the county of Southampton, England, is seated in a flat district, watered by the river Test, or Anton, at the distance of 8 miles S.W. from the town of Southampton, and 73 miles S.W. by W. from London. The town is of considerable antiquity, and probably derived its origin, as it certainly did its early importance, from an abbey founded here by Edward the Elder, and afterwards filled with Benedictine nuns by his successor, king Edgar. The first abbess of this monastery was Elleda, the daughter of a Saxon nobleman, named Ethelwold, who had greatly contributed to its original establishment, and whom some authors, therefore, designate as its founder. This lady was afterwards canonized, and constituted one of the patron saints of the abbey. She was succeeded in her office by several females of royal birth, and distinguished for the sanctity of their lives. In the year 992, Romsey and its monastery were plundered by the Danes; but the nuns and most of their valuables had been previously removed to Winchester, by order of the abbess Elwina. The buildings were soon restored, and the nuns replaced. In 1085, Christina, cousin to king Edward the Confessor, took the veil here, and was subsequently entrusted with the education of Matilda, daughter of Malcolm, king of Scotland, afterwards consort to Henry I. Mary, daughter to king Stephen, likewise became a nun in this abbey; but afterwards renounced the veil, and married Matthew, younger son of Theodoric, earl of Flanders; an event which called forth all the thunders of the Vatican against herself and her husband. The benefactors to this monastery were numerous; and previously to the dissolution, its revenues were estimated, according to Dugdale, at the annual value of 339*l.* 10*s.* 10*d.*; but Speed states their amount at 528*l.* 8*s.* 10*d.* Of the buildings which belonged to it scarcely a vestige remains, except the church, which is still used for divine service.

Romsey is governed by a corporation, consisting of a mayor, recorder, six aldermen, and twelve burgesses, besides inferior officers. The petty sessions for Romsey division of the hundred are held here. The market-day is Saturday, weekly; and there are fairs on Easter Monday, every Tuesday fortnight after 31st July until Christmas, 26th August, and 8th November. Formerly this town possessed a considerable woollen trade, but that is now greatly diminished, and is in part supplied by paper-works, and a packing manufactory. The chief public buildings here are the audit-house, which is a large square building, standing on piers, near the centre of the town; a town-hall; the parish church; and a large meeting-house for Presbyterians, built about ten years ago. The church, which alone de-

serves

erves particular notice, was formerly annexed to the abbey. The whole presents a series of interesting studies and details to the architectural antiquary. It consists of a nave, with aisles, a north and south transept, a choir, or chancel, with aisles, three small chapels or oratories at the east end, where is also an aisle, two small semicircular chapels at the angles of the transepts with the choir, and a low tower rising on four lofty arches, at the intersection of the transepts with the nave and choir. The eastern part of the church is certainly the most ancient, and is said by Dr. Latham to have been erected anterior to the Norman conquest. At the west end are some arches of a later age, probably about the era of king Stephen. In the south transept is an ancient statue of a female, probably one of the nuns. Near the south door is a crucifixion in bold basso relievo, close to which is a square niche, or cupboard, in the wall. At the east end of the north and south aisles of this church are two pillars, the sculptures on the capitals of which form the subject of some papers in the 14th and 15th volumes of the "Archæologia." That in the north aisle exhibits four human figures, besides two birds, a horse, and several mutilated bodies, &c.; the whole representing a field of battle. Two of the human figures are crowned, and one of them holds the other by the beard. Both have swords in their right hands, and seem in the act of striking with them; but each is restrained by a winged figure seizing his sword. To the right, at bottom, is a horse saddled; and in each corner, above, a bird of prey, loaded with mangled limbs, many of which are likewise dispersed in various places. The opposite pillar to this represents a more peaceable scene. In the centre stands a crowned personage in a loose robe. On the left is another crowned man, sitting bare-legged, and supporting one side of an angular label, the other side of which is held by a winged figure; and on the right is a similar label, held by two fitting figures habited in mantles. The legend on the first label is "Robert mefec"; and that on the second, "Robert tute consule + D.S." Dr. Latham makes the former refer to the battle and consequent peace between king Alfred and Guthrum, the Danish chief, who opposed him; and the latter to the foundation of the monastery. The figures of the two kings he supposes to represent Edward and Edgar; and the legend to mark the name of the consularius, or master mason of the buildings. Other capitals in this church are also ornamented with sculptured figures, &c. (See Carter's "Ancient Sculpture and Painting," folio.) Some ancient tomb-stones commemorate the names of abbesses buried beneath; and there is also a flat stone in remembrance of the celebrated sir William Petty, author of "A Treatise on Taxes and Contributions," "A Survey of Ireland," and several other works, who died in 1687. He was the son of a clothier at Romsey, and ancestor to the present marquis of Landisdown. Another eminent native of this town was Mr. Giles Jacob, author of Jacob's Law Dictionary, and of a work, entitled "Lives and Characters of English Dramatic Poets." According to the parliamentary returns of 1811, Romsey parish, including Romsey Infra et Extra, contained 933 houses, and 4297 inhabitants.

About half a mile to the south-west of Romsey is Broadlands, the seat of lord viscount Palmerston, whose father, the late lord, purchased it from the family of St. Barbe, which had possessed it for more than two centuries. The house is embellished with a fine collection of paintings, by the most eminent masters. Paulsons, a seat of lord viscount Mendip, is situated about three miles to the south-east. The house is not remarkable, but the grounds, which extend five miles in circumference, display the taste and skill of the celebrated Brown. Near this mansion is Tatchbury

Mount, which tradition reports to have been the scene of a royal hunting feat; but it appears more probable that it has been an ancient military station. The vallations are still clearly discernible on the declivity of the hill. Beauties of England and Wales, vol. vi. 8vo., by John Britton and E. W. Brayley. Archæologia, vols. xiv. xv.

ROMSOE, a small island of Denmark, in the Great Belt, near the coast of Funen. N. lat. 55° 30'. E. long. 10° 48'.

ROMULEA, in *Botany*, a name given by Maratti, in honour of the founder of Rome, to the Linnæan *Ixia Bulbocodium*; which Mr. Ker, in separating with other species, from *Ixia*, has thought proper to call *Trichonema*; nor shall we, by any means, contend for the above, though the original appellation of this genus. See TRICHONEMA.

ROMULUS, in *Biography*, founder and first king of Rome. See ROME.

ROMULUS, in *Geography*, a military township in the state of New York, in Cayoga county, between Seneca and Cayoga lakes. Its northern part is crossed by the road to the ferry at Cayoga lake. The township was incorporated in 1794, and comprehends, within its jurisdiction, the townships of Janus and Galen, and that part of the lands reserved to the Cayoga nation of Indians, W. of Cayoga lake. Its number of inhabitants is 1025.

ROMUNDA, a mountain of Carinthia; 6 miles S. of Mautten.

RON, a small rocky island of Denmark, in the Little Belt. N. lat. 55° 7'. E. long. 9° 55'.

RON, *Lynder*, a cluster of small islands in the Categat; 12 miles S. from the island of Lefoe.

RONA, one of the western islands of Scotland, is situated about sixteen leagues N.W. from the Butt of Lewis, and is supposed to lie farthest to the N.W. of any land in Europe. It is about a mile in length, and half a mile in breadth; and is included in the parish of Barvas, in the isle of Lewis. In this island is an ancient chapel, which is fenced round with a stone wall, and is kept clean and in good repair by the inhabitants. On the altar lies a large plank of wood about ten feet long, having as many holes in it, each pegged with a stone, to which the natives ascribe many virtues, particularly the promotion of speedy delivery to a woman in travail. The products of Rona are a few cows and sheep, and a small quantity of barley and oats. The custom of walking round a person sunways, to whom it is intended to express high esteem, is yet practised by the natives of Rona, all of whom are employed as servants by the tacksmen of the island, which was let on lease about fifteen years ago for the annual rent of four pounds. A Description of the Western Islands of Scotland, by M. Martin, 1716, 8vo. Carlisle's Topographical Dictionary of Scotland, 4to. 1813. The Statistical Account of Scotland, &c. by sir John Sinclair, bart. vol. xix. Edin. 8vo. 1797.

RONABEA, in *Botany*, an unexplained name, Aubl. Guian. v. 1. 154. t. 59. Just. 205. Lamarck Illustr. t. 166. This supposed genus appears, as Jussieu points out, so very near PÆDERIA, see that article, that we cannot consider them as distinct. Still, without examination of specimens, we durst not positively treat of it under that head. Aublet describes two species, *R. latifolia* and *erecta*; shrubby plants of Guiana, of no remarkable properties, the first with a twining stem, the other erect. The flowers are small and axillary.

RONALDSAY, NORTH, in *Geography*, the most northerly of the Orkney islands, Scotland, is so called to distinguish it from South Ronaldsay, the subject of the next article, to which, however, it bears no sort of resemblance.

It is separated from the isle of Sanday by a rapid and dangerous frith, two miles in breadth, and contains an area of four square miles in extent, which supports about 500 inhabitants. The whole island is flat, and little raised above the level of the ocean, which rendered it peculiarly dangerous to navigators, previous to the erection of a lighthouse on its north-eastern extremity. It is nevertheless dry and healthy, and produces both corn and grafs of excellent quality, and sufficient to supply the home consumption. The inhabitants are sober, honest, and industrious, beyond the generality of the Orkney islanders. In winter, their chief occupation is the care of their cattle and crops, and fishing, when the weather will permit their venturing to sea. In spring they are employed on the land, as in other places; and when summer arrives, almost every individual is actively engaged in the manufacture of kelp, of which they make about 120 tons every year. Near the centre of the island is a single stone monument, ten feet high, and four broad, round which it is customary for the inhabitants to assemble annually, on the first day of January, to usher in the new year with the song and the dance. Tumuli are numerous, one of which, on being opened, "was found to contain a building of nine feet in diameter, circular on the outside, and square and hollow within, in the bottom of which was a well, and in the upper part the skeleton of a man in nearly an upright attitude." History of the Orkney Islands, by the Rev. Dr. Barry; second edition, by the Rev. James Headrick, 4to. Lond. 1808.

RONALDSAY, *South*, one of the Orkney islands, Scotland, is situated to the southward of the Mainland of Orkney, at the distance of seven miles from Duncansby Head, in Caithness. In superficial extent it contains about eighteen square miles; and its inhabitants amounted to 1631 in the year 1811. The greater part of this island is very well cultivated; and is equally fit for corn and pasture. Of the former, a larger quantity is raised than can be consumed at home, and hence a considerable exportation takes place to the Mainland. The bowels of the earth contain lead ore, of which a very promising vein has been discovered at Grimness Head, and another at Widewall. The shores abound with kelp, which is a source of great wealth to the inhabitants; and the sea affords fish in vast numbers, and of the best quality. An English company employs about twenty vessels in carrying cod-fish and lobsters to the London market. This island is excellently furnished with harbours: for, besides several places where ships may anchor for a time, it has the safe and commodious road of St. Margaret's Hope on the north, and the bay of Widewall on the south. Here are also some interesting objects of antiquity. On the summit of a hill, near Stow's Head, are the remains of a monument composed of three upright stones, placed in a triangular form, but only one of them is now standing. Another stone monument is situated in the beautiful vale of Paplay. It consists of a single block of stone, sixteen feet high, and destitute of all marks of human art, by which to discriminate its use. Similar stones of smaller dimensions may be seen in other parts of the island, which likewise affords a number of tumuli, and several of those buildings usually called Picts-houses; also the ruins of some Catholic chapels and chantries. History of the Orkney Islands.

RONAY, one of the western isles of Scotland, is situated between the Mainland and the Isle of Skye. It is about four miles in length, and two in breadth; and has a more level surface, and greater fertility of soil, than most islands of the Hebrides; but its cultivation is much neglected. On the western side of the island is an excellent harbour for shipping; and round the coast the sea has hollowed out several caves, some of which afford fine specimens

of stalactites. Carlisle's Topographical Dictionary of Scotland, 4to. 1813. Sinclair's Statistical Account of Scotland, vol. xvi. 8vo.

RONCA *de Scaglia*, a town of Italy, in the department of the Panaro; 20 miles S. of Modena.

RONCADOR, an island in the Caribbean sea. N. lat. $13^{\circ} 45'$. W. long. $79^{\circ} 30'$.

RONCADOR, or *Rum Key*, one of the smaller Bahama islands. N. lat. $23^{\circ} 26'$. W. long. $75^{\circ} 3'$.

RONCAGLIA, FRANCESCO, in *Biography*, an Italian opera singer, with a soprano voice, who arrived in England in 1777 as first man in our lyric theatre, when Sacchini was here, and the Danzi, afterwards madame Le Brun, was first woman.

Roncaglia had a beautiful face, and elegant figure; a sweet-toned voice; a chaste and well-disciplined style of singing; hazarded nothing, and was always in tune. The best part of his voice, which was a soprano, was from D to A; he sometimes went to C, but not easily. Both his voice and shake were feeble; and of the three great requisites of a complete stage singer, pathos, grace, and execution, which the Italians call *cantabile*, *graziosa*, and *bravura*, he was in perfect possession of only the second. As his voice, though of an exquisite quality, was by no means powerful, and little more than a *voce di camera* (more suited to a room than a spacious theatre), his singing at concerts, when confined to the *graziosa* style, left nothing for an audience to wish. He was of the Bologna school, formed by Pitocco and Bernacchi, and reminded his hearers of one of their best scholars, Guarducci.

Roncaglia remained here two seasons, and was succeeded by Pacchierotti.

RONCAGLIA, in *Geography*, a town of Italy, in the duchy of Piacenza; 8 miles E. of Piacenza.—Also, a town of the county of Tyrol; 14 miles N.E. of Trent.

RONCARUOLO, a town in the duchy of Piacenza; 4 miles E.N.E. of Piacenza.

RONCAU, a town of the island of Dominica.

RONCEVALLOS, a town of Spain, in Navarre, situated in a valley of the same name, between Pamplona and St. Jean Pie de Porte. This valley has been celebrated in romance for the defeat of the emperor Charlemagne, and the death of Roland; 14 miles N.N.E. of Pamplona.

RONCHAMPS, a town of France, in the department of the Upper Saone; 5 miles E. of Eure.

RONCHAUX, a town of France, in the department of the Doubs; 3 miles S. of Quingey.

RONCIGLIONE, a town of Italy, and capital of a county, to which it gives name, in the Patrimonio; 10 miles S. of Viterbo. N. lat. 42° . E. long. $12^{\circ} 8'$.

RONCINA, a town of Austria, in the county of Goritz; 5 miles N. of Goritz.

RONCO, a town of the Ligurian republic; 15 miles N. of Genoa.

RONCOFERRATO, a town of Italy, in the department of the Mincio; 7 miles E. of Mantua.

RONCOFREDDO, a town of Italy, in the department of the Rubicon; 9 miles W. of Rimini.

RONDA, a town of Spain, in the province of Grenada, situated on a fertile spot, which supplies Cadiz with all kinds of fruit and vegetables. The soil, which is of a reddish colour, abounds with pebbles, and resists the action of fire; and it is therefore used in furnaces for fusing iron. The adjacent country is famous among other curiosities for that species of Viverra, called Genette (see VIVERRA); and also for wild bulls, wolves, and other ferocious animals: its rocks serve also as a retreat for eagles, ospreys, and kites; 35 miles W. of Malaga. N. lat. $36^{\circ} 45'$. W. long. $5^{\circ} 15'$.

RONDE,

RONDE, or RHONDS, a small island of the West Indies, near the north coast of the island of Grenada. It has about 500 acres of excellent land, employed in pasturage, and the cultivation of cotton.

RONDE Haye, La, a town of France, in the department of the Channel; 6 miles N. of Coutances.

RONDE, Fr., in *Musïc*, a semibreve. See TIME-TABLE, and *Musical* CHARACTERS.

RONDE de Table, Fr. a kind of *chanson à boire*, or drinking song, with a *refrain*, or burden to it, and generally mixed with sentiments of gallantry, composed of different stanzas, which are sung by turns at table, and in which all the guests join chorus in the refrain.

RONDEAU, Fr., an air of two or more strains, always returning to, and finishing with the first. In order to do this in an artful, pleasing manner, the modulation should pass into some key relative to that of the first strain.

Rousseau has very justly censured the writing and setting vocal rondeaus, in which the thought is begun in one strain, and continued or ended in another; or begins with a simile, of which the application is made in the second strain.

The term *rondeau*, derived from *rondel*, is of great antiquity in France. In old English it was called a *roundelay*.

But Rousseau, after pointing out poetical and musical defects in the composition of rondeaus, indicates the means of avoiding both. "Whenever a sentiment, expressed in the first strain, suggests a reflexion which confirms and enforces it in the second; whenever a description of the finger's state of mind is the subject of the first strain, and illustrates a simile in the second; whenever an affirmation in the first strain, contains its proof and confirmation in the second; every time, in short, that the first strain contains a proposition to perform some action, and a reason for it is given in the second; in these, and similar cases, a rondeau will be always well placed."

RONDEL, in *Fortification*, a round tower, sometimes erected at the foot of a bastion.

RONDELETIA, in *Botany*, was so named by Plumier, in memory of William Rondelet, a physician of Montpellier, who died chancellor of that university in 1566, aged fifty-nine. He is most celebrated for his work on Fishes; but his studies were much directed to Botany, so far as concerned the *Materia Medica*; and he is said to have deeply investigated the writings of Dioscorides.—Plum. Gen. 15. t. 12. Linn. Gen. 90. Schreb. 120. Willd. Sp. Pl. v. 1. 930. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 366. Swartz Obs. 66. t. 10. f. 2. Juss. 201. Lamarck Illustr. t. 162. (Lightfootia; Schreb. 122.)—Class and order, *Pentandria Monogynia*. Nat. Ord. *Stellate*, Linn. *Rubiaceae*, Juss.

Gen. Ch. *Cal.* Perianth of one leaf, superior, in five deep, acute, permanent segments. *Cor.* of one petal, funnel-shaped; tube cylindrical, longer than the calyx, very slightly inflated at the summit; limb flat, somewhat reflexed, in five deep roundish segments. Nectary a crenate ring in the orifice. *Stam.* Filaments five, awl-shaped, inserted into the middle of the tube; anthers simple. *Pist.* Germen roundish, inferior; style thread-shaped, as long as the corolla; stigma cloven. *Peric.* Capsule roundish, crowned with the calyx, of two cells. *Seeds* two or more in each cell, rarely solitary.

Eff. Ch. Corolla funnel-shaped, nectariferous at the mouth. Capsule of two cells, with several seeds, roundish, inferior, crowned with the calyx.

A genus of West Indian, simple and entire-leaved, shrubs, to which the discoveries of Swartz have added several species. Three only are mentioned in the Hortus Kewensis,

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nor are any of them in general cultivation; though some possess fragrance as well as elegance. Two have four-cleft tetrandrous flowers. Jussieu terms the fruit a berry, which seems incorrect. *Rondeletia asiatica*, Linn. Sp. Pl. 244, is perhaps an *Ixora*, or *Pavetta*.

1. *R. americana*. Corymbose *Rondeletia*. Linn. Sp. Pl. 243. Willd. n. 1. Ait. n. 1. (*R. arborescens*, tini facie; Plum. Ic. 237. t. 242. f. 1.)—Leaves elliptic-lanceolate, acute. Panicles repeatedly forked, on long stalks, rising above the stem.—Native of the West Indies. Cultivated by Miller, before the year 1752. Mr. Aiton says it flowers in the stove in August. We have seen no specimen, neither had Linnæus. His description is taken from Plumier's figure, as follows. "A *shrub*, with opposite, sessile, lanceolate leaves. *Common flower-stalks* solitary, very long, naked, forming at the top a forked *corymbus*, in each of whose subdivisions is a sessile flower, with a two-leaved involucre;" more properly a pair of bractæ. The flowers are very numerous, about an inch long. Leaves not quite sessile, somewhat deflexed, entire, two or three inches long, and one or one and a half broad.

2. *R. odorata*. Fragrant *Rondeletia*. Jacq. Amer. 59. t. 42. Linn. Sp. Pl. 1671. Willd. n. 2. Swartz Obs. 67. (*R. obovata*, by an error of transcription; Linn. Syst. Nat. ed. 12. v. 2. 163.)—Leaves ovate, bluntish, rough; somewhat heart-shaped at the base; on short stalks. Flower-stalks cymose, three-cleft, terminal. Native of the West Indies, but rare. Swartz. Jacquin found it in rocky places, near the sea, at the Havannah, bearing flowers, as well as ripe seeds, in January. The habit of this *shrub* is inelegant and straggling; its height six feet; the young shoots villous. Flowers in terminal tufts, each tuft about two inches broad; their smell very sweet, resembling violets. The corolla has often six segments, though the stamens are never more than five; its colour is vermilion, with an orange nectariferous ring.

3. *R. hirta*. Hairy *Rondeletia*. Ait. Hort. Kew. ed. 1. v. 1. 227. ed. 2. n. 3. Willd. n. 13. Swartz Ind. Occ. v. 1. 373.—Leaves oblong, pointed, hairy, rigid; ribbed beneath. Flower-stalks axillary, three-forked, erect.—Native of Jamaica, from whence it was imported about the year 1776, by John Blackburne, esq. of Orford, Lancashire. It blooms in the stove in summer. This is said in Hort. Kew. to be very nearly akin to *R. odorata*, differing merely in its axillary inflorescence; larger, more acute, leaves, not rough on their upper surface, nor scarcely heart-shaped at the base; and longer footstalks. The tube of the corolla is but twice the length of the calyx. Style prominent beyond the mouth. Stigmas erect, converging. Corolla reddish-yellow. Swartz says there are only two seeds perfected, of a hemispherical figure, and that the footstalks are short and hairy. His description agrees in other respects with Mr. Aiton's.

4. *R. levigata*. Smooth-leaved *Rondeletia*. Ait. n. 2.—Leaves stalked, elliptical, acute, very smooth, except the rib underneath. Stipulas elliptical, membranous, smooth. Panicles three-forked, axillary, somewhat hairy.—Native of the West Indies, flowering in our stoves in spring or summer. It was introduced, in 1790, by Mr. William Anderson. The stem is shrubby, spreading, with forked round branches, slightly hairy when young. Leaves two or three inches long, acute at each end, rather fleshy; very smooth above; paler beneath, with a reddish, sometimes hairy, rib and veins. Stipulas very large, elliptical, obtuse, reddish. Flowers reddish, small, their tube scarcely longer than the limb. Base of the calyx clothed with long hairs.

5. *R. trifoliata*. Three-leaved *Rondeletia*. Linn. Sp. Pl.

RONDELETIA.

PL 1671. Willd. n. 3. (*R. trifolia*; Jacq. Amer. 60. t. 43. "R. arborefcens, tini facie; Ehret Piët. t. 15.")—Leaves on long hairy stalks, whorled, lanceolate, acute; somewhat downy beneath. Stipulas pointed. Panicles axillary, compound, hairy.—Native of Jamaica, flowering in February.—An upright tree, twelve feet high. Young branches obtusely triangular, hairy. Leaves three in a whorl, lanceolate, acute, entire, three inches long; smooth above; slightly downy beneath; with hairy footstalks. Stipulas roundish, pointed, ternate, alternate with the leaves. Clusters axillary, one inch and a half or more in length, hairy, unequal, branched. Flowers inodorous, small, reddish, sessile or stalked. Fruit not examined. Jacquin.—On comparing Browne's specimen of his *Petesia*, t. 2. f. 3, with Jacquin's plate and description of this *Rondeletia*, we are persuaded they must be the same thing. Consequently the *Ixora americana* of Linnæus, an ambiguous and obscure plant, ought to be expunged, and referred hither. (See IXORA, n. 11.) Swartz quotes this synonym of Browne for his *racemosa*, (see the following); but a comparison of specimens shews them to be distinct, though very nearly akin.

6. *R. racemosa*. Smooth Racemose *Rondeletia*. Swartz Ind. Occ. v. 1. 360. Willd. n. 7, excluding Browne's synonym.—Leaves on long smooth stalks, ovato-lanceolate, pointed, smooth on both sides. Stipulas abrupt, pointed. Clusters axillary, three-forked, spreading, smooth.—Native of uncultivated hills in Jamaica. Like the last in habit, but the leaves are opposite, more coriaceous, and quite smooth, as well as the footstalks and flower-stalks. The stipulas are fringed, like the bractæas and calyx. Corolla externally finely downy, as in Browne's specimen just alluded to under *R. trifoliata*.

7. *R. virgata*. Long-branched *Rondeletia*. Swartz Ind. Occ. 354. Willd. n. 4.—"Leaves heart-shaped, roundish. Branches spreading, thread-shaped. Flower-stalks three-cleft. Flowers three together, crowded. Stamens four."—Gathered by Swartz in bushy places, near the sea, in the northern part of Hispaniola, flowering and fruiting in December.—A shrub about six feet high, with very long, spreading, alternate, rough-barked twigs. Leaves half an inch long, on short stalks, somewhat reflexed, very smooth. Stipulas minute, acute. Flower-stalks axillary and terminal, opposite, elongated and erect, resembling branches, and often bearing a pair or two of leaves, three-cleft; the terminal ones leafless, and bearing but three flowers. Flowers terminal, brownish-purple, silky at the outside; four-cleft, with four very short stamens. Seeds several, minute, compressed.

8. *R. pilosa*. Hoary *Rondeletia*. Swartz Ind. Occ. v. 1. 356. Willd. n. 5. (*R. triflora*; Vahl. Symb. v. 3. 34. t. 54.)—Leaves ovato-lanceolate, hairy on both sides. Flower-stalks axillary, shorter than the leaves, three-flowered. Stamens four.—Native of the West India islands, of Santa Cruz, and Montserrat. A shrub, whose young branches, leaves, stalks, calyx, and outside of the corolla, are clothed with fine, soft, hoary pubescence. Leaves on still more hairy footstalks, elliptic-lanceolate, with a small acute point, two or three inches long, ribbed; paler, or glaucous, beneath. Flower-stalks opposite, axillary, rather shorter than the leaves, hairy, each bearing three flowers, of which the middlemost has the shortest partial stalk. Bractæas, and segments of the calyx, long, awl-shaped. Corolla four-cleft; somewhat downy within, but moist without. We have no account of the colour, as Swartz seems not to have gathered this species himself. The dried flowers are brown, with some indication of a tawny hue.

9. *R. thyrsoides*. Tufted *Rondeletia*. Swartz Ind. Occ. v. 1. 358. Willd. n. 6.—Leaves oblong, acute, membranous; downy beneath. Stipulas ovate, acute, smooth. Clusters axillary, dense, many-flowered.—Native of dry barren hills, in the western part of Jamaica, flowering in May. A smooth, branching shrub, six feet high, with long, spreading, bluntly quadrangular twigs. Leaves three inches long, acute at each end, ribbed, veiny; smooth above. Footstalks an inch long, striated. Stipulas close-pressed, broad, ovate, acute, smooth, rigid. Clusters dense, oblong, shorter than the leaves, on smooth stalks, their branches opposite, crossing each other, subdivided; the last usually three-flowered. Flowers small, yellowish-white, or rusty-coloured, highly fragrant at night. Bractæas minute, awl-shaped. Calyx very minute, five-toothed. Corolla five-cleft, with five stamens. Seeds two in each cell, rounded, somewhat angular, striated.

10. *R. laurifolia*. Laurel-leaved *Rondeletia*. Swartz Ind. Occ. v. 1. 363. Willd. n. 8, excluding Browne's synonym.—"Leaves lanceolate-oblong, acute, smooth on both sides. Stipulas deltoid. Clusters axillary, compound, erect. Tube of the corolla very short."—Grows in bushy places in Jamaica.—Branches round, smooth. Leaves laurel-like, three or four inches long, ribbed, veiny; paler beneath. Footstalks an inch long, smooth, flat on the upper side. Stipulas broad, combined, deltoid, pointed, spreading, rigid, downy at the edge. Clusters often as long as the leaves, compound, their ultimate divisions mostly three-flowered. Bractæas very minute. Flowers small, brownish-yellow, five-cleft. Seeds in an early state numerous, membranous, but two only arrive at maturity, which are hemispherical.—We cannot but dissent from our learned friend professor Swartz, in his citation of Browne's t. 2. f. 2, and consequent remarks. That plate certainly represents the *Petesia stipularis* of Linnæus, which was described from Browne's own specimen, and the leaves arc, on both sides, finely downy, though no such character is expressed in the engraving. The inflorescence is thyrsoid, and not half so long as the leaves. See the next species.

11. *R. tomentosa*. Downy-leaved *Rondeletia*. Swartz Ind. Occ. v. 1. 365. Willd. n. 9. (*Petesia stipularis*; Linn. Sp. Pl. 160. P. fruticosa, foliis ovatis oppositis, &c.; Browne Jam. 143. t. 2. f. 2.)—Leaves elliptic-lanceolate, pointed, downy. Flower-stalks three-forked, axillary, much shorter than the leaves.—Native of stony hills in Jamaica, near the shady road called Sixteen-mile walk, not far from Spanish town. Swartz. A specimen from the author shews this to be precisely the above plant of Linnæus and Browne, as Swartz suspected. We refer the reader to PETESIA for its description, and for remarks on the uncertainty of that genus, which perhaps must hereafter be sunk in *Rondeletia*.

12. *R. umbellulata*. Umbellate *Rondeletia*. Swartz Ind. Occ. v. 1. 367. Willd. n. 10.—Leaves elliptic-lanceolate, acute, somewhat hairy. Stipulas ovate, pointed, membranous, hairy. Flower-stalks axillary, three-forked. Flowers somewhat umbellate.—Native of rocky banks of rivers in Jamaica, flowering in April. Swartz. That author suspects his plant may be the same with Browne's third *Petesia*, which we have adopted by the name of *villosa*, n. 4. This may possibly be the case; but having no specimen of what Browne intended, we cannot determine the point. Swartz's plant, communicated by himself, is a branching upright shrub, two feet or more in height; the branches smooth, somewhat compressed; hairy and leafy at the summit. Leaves about three inches long, clothed with short scattered hairs, and supported by hairy stalks, half

an inch in length. *Stipulas* large, concave, most hairy within, with a taper reflexed point. *Flower-stalks* not half the length of the leaves. *Flowers* collected into a sort of round head. *Braçtas*, and segments of the *calyx*, lanceolate, hairy. *Corolla* larger than in some of the foregoing, brownish-yellow. Two seeds are perfected in each cell.

13. *R. incana*. Silvery-cupped *Rondeletia*. Swartz Ind. Occ. v. 1. 369. Willd. n. 11.—Leaves ovato-lanceolate; rough and hoary beneath. Stalks axillary, simple, three-flowered. Segments of the calyx ovate, silky on both sides.—Found by professor Swartz, from whom we have a specimen, on calcareous rocky mountains of Jamaica, but rarely. A shrub, two or three feet high, with round, rigid, rough branches. Leaves about the extremities of the branches, three inches long, somewhat coriaceous; smooth and shining above; palish and hairy or downy beneath, with a prominent hairy rib and veins. Footstalks stout, silky, three-quarters of an inch long. *Stipulas* very short, fringed. *Flower-stalks* axillary, opposite, twice the length of the footstalks, silky, each bearing three large, nearly sessile, flowers, whose globular germen, and large ovate segments of the calyx, are entirely clothed with long, dense, silky hairs; as are also the lanceolate bractes.

14. *R. hirsuta*. Rough *Rondeletia*. Swartz Ind. Occ. v. 1. 371. Willd. n. 12.—“Leaves oblong, acute, hairy. Stalks axillary, three-forked, lax. Flowers hairy.”—Native of bushy hills, in the south part of Jamaica, blossoming in January. A shrub six feet high, with a smooth stem, and rough, lax, slightly compressed branches. Leaves on short, hairy, reddish stalks, oblong, broadish in the middle, ribbed, veiny, hairy on both sides, pale beneath. *Stipulas* broad, ovato-lanceolate, long and hairy. *Flower-stalks* opposite, slender, about the length of the leaves, twice three-cleft, lax, hairy. *Flowers* stalked, yellowish, externally hairy. *Braçtas* minute, linear, acute, hairy. Differs from *hirta*, n. 3, in having less rigid leaves, with lax, not stiff, branches and flower-stalks. Swartz. We have seen no authentic specimen; for one marked *hirsuta*, by the younger Linnæus in his herbarium, seems rather to be Swartz's *hirta*. The descriptions of these two species are not at all well contrasted.

The division of this genus into two sections, by the number of the seeds, is better omitted, as it separates species most nearly akin, and is besides very uncertain. All have the rudiments of several seeds in each cell of the germen, though a greater or less number is perfected in some than in others, or rather perhaps, according to circumstances, in the same.

RONDELETIA, in *Gardening*, contains plants of the woody, exotic, stove kind, of which the species cultivated is the American *rondeletia* (*R. americana*).

Method of Culture.—This plant may be increased by sowing the seeds on a moderate hot-bed in the early spring, and when the plants have attained a little growth they should be removed into separate pots, being plunged in the bark-bed of the stove, where they are to remain and be managed as other tender exotic plants of a similar kind. They afford variety in stove collections.

RONDENCHE, in *Geography*, a town of Russia, in the government of Riga; 28 miles S.W. of Narva.

RONDERO BAY, a bay on the N.E. coast of Antigua. N. lat. 17° 15'. W. long. 61° 26'.

RONDINE, in *Ichthyology*, a name by which some authors have called the *milvus*, or flying-fish.

RONDINE Pesce, a name by which some have called the *hirundo piscis*, or swallow-fish, called by others *mugil alatus*.

RONE, in *Geography*, a small island near the W. coast of Scotland. N. lat. 58° 26'. W. long. 4° 55'.

RONEBY, a town of Sweden, in the province of Blekingen; 10 miles W. of Carlscrona.

RONES, a cape on the W. coast of the island of Jersey; 6 miles N.N.W. of St. Helice.

RONGOS, or *PONGOS*, trumpets, or rather French horns, of the kingdom of Loango, in Africa. These instruments are made of ivory, and resemble hunting-horns of the ancients: their widest diameter at the mouth is an inch and a half, or two inches; they are of various kinds, and probably serve for treble and base to each other. It is pretended, that many rongos united produce a very harmonious effect. (Supplement to the folio Encyclopédie.) The editor of the article forgot that, out of Europe, treble and base performing together, except in octaves, is unknown, and that harmonious effects can be no otherwise produced.

RONNE, in *Geography*, a river of France, which rises about a league N. of Leuze, and runs into the Scheldt, between Tournay and Oudenarde.

RONNE, or *Ronde*, a sea-port town of Denmark, in the island of Bornholm, the residence of the governor. The harbour is not deep, but well fortified.

RONNEBURG, a town of Saxony, in the principality of Altenburg; 12 miles S.W. of Altenburg. N. lat. 50° 48'. E. long. 12° 5'.

RONNEBY. See *ROTNEBY*.

RONNEN, a small island of Denmark, near the N.W. coast of the island of Laland. N. lat. 56° 5'. E. long. 11° 15'.

RONNSKAR, a small island on the W. side of the gulf of Bothnia. N. lat. 65° 3'. E. long. 18° 24'.—Also, a small island on the E. side of the same gulf. N. lat. 63° 29'. E. long. 22° 2'.

RONO, a small island on the W. side of the gulf of Bothnia. N. lat. 63° 5'. E. long. 18° 24'.

RONOBO, a river of the island of Celebes, which runs into Sewa bay, N. lat. 1° 33'. E. long. 120° 46'.

RONOUMENA, a river of Madagascar, which runs into the sea at Port St. James.

RONSARD, PETER DE, in *Biography*, a French poet of considerable celebrity, was born in the year 1524, of a noble family, in the Vendomois. He was educated at the college of Navarre in Paris; but he quitted his studies at an early age, and entered into the service of the duke of Orleans. From the service of this prince he was transferred to that of James V. of Scotland, who had married Magdalen of France. With this sovereign he passed two years, partly in Scotland, and partly in England; and then returning to France, was again taken into the employment of the duke of Orleans. He accompanied Lazare du Baif to the diet of Spire, who inspired him with such a taste for the belles lettres, that he applied himself with assiduity to the Greek language. He at length entirely devoted himself to poetry, by which he obtained the title of the prince of the poets of his time. He obtained the first prize at the floral games of Touloufe, and the ordinary recompence being thought unequal to his merit, he was presented by the city with a Minerva of massy silver. He was patronized by five successive kings of France, especially Charles IX., who maintained a poetical correspondence with him. Mary, queen of Scots, who greatly esteemed him, made him a rich present. He had some benefices conferred upon him, though he was not in priest's orders; and he displayed great zeal in opposing those of the reformed religion, against whom he fought, in 1562, at the head of the Vendomois. Like many religious zealots, he made his faith stand in-

stead of morals, being deeply addicted to licentious pleasures, by which he brought on a premature old age. In the latter years of his life he was a penitent, and felt deep contrition for the licentiousness of his muse at an earlier period, and resolved for the future to confine himself to sacred subjects. He died in 1585, at the age of 61, and his memory was honoured by eulogies from many of the literary characters of the time. The compositions of Ronfard were odes, eclogues, epigrams, sonnets, hymns, and a poem, entitled "La Franciade." Ronfard had a very bad taste, which rendered him pedantic, and often obscure; but he possessed many excellent qualities as a poet, having warmth of temper, a vivid imagination, and great quickness of invention. Very few of his works remain; but three of the best have frequently been reprinted, *viz.* "La Promesse," "Hymne à l'Eternité," and "Les Quatre Saisons de l'Année."

Ronfard was praised by all the poets of his time, and still merits a part of their encomiums. Scaliger dedicated to him a work, as the first poet in France. He was handsome in person, well made, loved music passionately, sung agreeably, and was very liberal. He had a public and magnificent funeral; the service was set in florid or figurative counterpoint, animated by all kinds of instruments: it was sung by the children of the chapel-royal by order of the king, who regretted extremely the death of so eminent a personage, the ornament of his kingdom. After his interment, Dupéron pronounced his funeral oration. All that were great and illustrious at court and in the city attended; and the crowd was so great, that cardinal Bourbon, and many other princes and nobles, were obliged to return without being able to gain admission into the chapel of the college of Boncourt at Paris.

RONSBERG, in *Geography*, a town of Bohemia, in the circle of Pilsen; 8 miles W. of Teinitz.

RONSDORF, or RHEINSDORF, a town of the duchy of Berg; 12 miles S.S.E. of Duffeldorf.

RONSE. See RENAY.

RONSEL, a town of Germany, in the county of Mentz; 7 miles S.W. of Lunschede.

ROSENAC, a town of France, in the department of the Charente; 18 miles E. of Angouleme.

ROO, in *Agriculture*, a provincial term signifying rough or coarse, in the way of pastures, or the crops on other sorts of land.

ROOAC, in *Rural Economy*, a provincial word used to signify a fog or mist. See ROAK.

ROOAH, in *Geography*. See REWAH.

ROOHOAGA. See RIU's *Island*.

ROOD, a quantity of land, equal to the fourth part of an acre; and containing 40 square perches, or poles.

This is the statute rood by which land is usually at present measured; but there are local measures in many districts, in which both the rood and acre are considerably larger. See MEASURES.

In Scotland, the rood contains 40 square falls. See FALL.

ROODAUN, in *Geography*, a town of Hindoostan, in Oude; 22 miles N.W. of Allahabad.

ROODE, or WAVEREN, an extensive transmontane division of the district of Stellenbosch and Drakenstein, in Southern Africa, in the Cape district, lying behind the mountains of Drakenstein, and producing abundance of grain, pulse, fruits, and wine. The pass of Roode Sand is the only waggon-road in this division, and is distant from Cape town about 70 miles. In this division there is a small seat church, and a very comfortable parsonage-house, with

extensive vineyards, orchards, garden, and arable land; and contiguous to the church is a row of houses, the number of which has lately increased.

ROODLOFT, the gallery over the entrance into the choir, in our ancient cathedral and abbey churches; in the front of which, looking towards the west window, a large rood, or crucifix, was usually placed.

ROOE, LITTLE, in *Geography*, a small island among the Shetlands. N. lat. 60° 43'. W. long. 1° 35'.

ROOF, in *Architecture*, is that part of a building generally consisting of two sloping sides, which protects its contents or inhabitants from inclement seasons or weather.

The slope of the roof must be directed by the nature of the climate. The ancient Egyptians, Babylonians, Persians, as well as other Eastern nations, made their roofs quite flat. The Greeks, it would appear, were the first people who made roofs with a declination each way from the middle to the edges; and this was very gentle, the height from the ridge to the level of the walls not exceeding one-ninth or one-eighth part of the span, as may be seen by many ancient temples now remaining. But in northern climates, subject to rain and snow, the height of the ridge must be very considerable. In most old buildings in Britain, the equilateral triangle seems to have been considered as the standard, both in private and public edifices; and this pitch seems to have continued for several centuries, until the extinction of Gothic architecture. At the commencement of this period, the ridge was made somewhat lower, and the rafters were three-fourths of the breadth of the building. This was called the true pitch, and subsequently the square seems to have been considered as the true pitch. The heights of roofs were gradually depressed from the square to one-third of the width, and from that to a fourth, which now seems to be a very general standard. They have even been executed much lower. There are some advantages in high pitched roofs: they discharge the rain with greater rapidity, the snow continues to lie a much shorter time on the surface, and they are less liable to be stripped by heavy winds. Low roofs require large slates, and the utmost care in execution; but they have this advantage, that they are much cheaper, since they require shorter timbers, and of a much smaller scantling. The roof is one of the principal ties to a building, when executed with judgment: it binds the exterior walls to the interior, and to the partitions, which act like strong counterforts against them.

Roofs are of various forms, which depend on the nature of the plan, the law of the horizontal and vertical sections. The most simple form of a roof is that which has only one row of timbers, arranged in an inclined plane, which throws the rain entirely to one side. This form is called a shed-roof, or lean-too. But the most elegant roof for a rectangular building is that which consists of two rectangular planes, of equal breadth, equally inclined to, and terminating in a line parallel to, the horizon; and consequently the form of the roof is that of a triangular prism, each side being equally inclined to the plane of the wall-head. This form of roof is sometimes called a pent-roof.

When the form of the plan is that of a trapezium, and the wall-heads properly levelled, the roof cannot be executed on planes, so as to terminate in a level ridge. In this case, the sides, instead of being planes, are made to wind, in order to have the summit parallel to the horizon; but the most eligible method is to make the sides of the roof rectangular planes, inclosing a level space, or flat, in the form of a triangle or trapezium, at the summit of the roof.

Roofs, which are flat on the top, are said to be truncated.

ROOF.

Truncated roofs are chiefly employed in order to diminish the height, so as not to predominate over that of the walls.

When all the four sides of the roof are formed by inclined planes, the roof is said to be hiped, and is, therefore, called a hiped roof: the inclined ridges, which spring from the angles of the walls, are called the hips. Roofs of this description are frequently truncated; and when the plan of the walls is in the form of a trapezium, the truncation of the roof becomes necessary.

Roofs which stand upon circular bases, and which have all their horizontal sections circular, and the centres of the circles in a straight line drawn from the centre of the base perpendicular to the horizon, are called revolved roofs.

When the plan of the roof is a regular polygon, or a circle, or an ellipse, and the horizontal sections are all similar to the base, and a vertical section a portion of any curve convex on the outside, the roof is called a dome.

In order to save the expence of lead in rectangular roofs, instead of the flat, a valley is sometimes used, which makes the vertical section in the form of the letter M, or rather an inverted W; and thus it is that this form of roof has obtained the name of an M roof.

Before we proceed to the construction of roofing, it will be necessary to shew upon what principles a body or piece of timber may be supported in various positions.

Theory and Practice of Roofs.

PROP. I.

If a heavy body $ABCD$ (*Plate XLII. fig. 3. Architecture.*) be suspended by any two inclined strings, DE and CF , in a vertical plane, a right line drawn through the intersection, perpendicular to the horizon, will pass through the centre of gravity of the body.

It is shewn by the writers on mechanics, that if any three forces act upon a point, or a body, their directions will tend to the same point, or be parallel to each other. It is well known that every body acts with its full force in one point only, *viz.* in its centre of gravity, and in a direction perpendicular to the horizon: therefore, if a body is sustained at E and F , it will revolve round these points, until the line GH , passing through the intersection, H , of the two strings, DE and CF , and the centre of gravity G , become perpendicular to the horizon.

Cor. 1.—Hence if any body be supported by two strings, it may also be supported by two planes perpendicular to these strings, provided that the two points of the body supported are in the direction of the strings; for every body, acting upon a plane, acts in a line perpendicular to that plane.

Cor. 2.—Hence, also, a body may be supported by two props in any two directions that may be supported by strings, provided that the surface of the body, at the points of contact, or the ends of the props, be planes at right angles to the strings.

Cor. 3.—Hence all the properties that have been demonstrated of three forces acting upon a body, supposed void of weight, will equally flow from a heavy body supported by two strings, by substituting the weight of the body for the middle force; and hence, if the direction of any force supporting a heavy body be given, the other may easily be found.

PROP. II.

Given the position in which a body should be placed, and the position of a plane supporting the body at one end,

to find the position of another plane to support it at another given point, and to find the pressure on the planes, the weight of the body being given.

Through the centre of gravity of the body draw a vertical line, and through any point on which the body rests on the given plane draw a line perpendicular to that plane, meeting the vertical line; from the intersection draw a line to the other point which is to be supported; from that point draw a plane at right angles to this line, which will be the direction of the plane required. And to find the intensity of the forces, take any distance on the vertical line to represent the weight of the beam from the intersection; then on that line, as a diagonal, complete a parallelogram, whose sides are in the directions of the lines, perpendicular to the supporting planes; and the side of the parallelogram, perpendicular to either plane, will represent the force on that plane.

Example 1. Plate XLII. fig. 2.

Let the body $ABCD$ lie upon the top of the wall KC , at C , so as to touch the lower edge, BC , of the body, at that point C ; it is required to find the direction of a plane that will support the lower end at B , and to find the pressure of the body on the wall and on the plane.

Through the centre of gravity, G , of the body draw the vertical line GF ; draw CF perpendicular to CB , join FB , and draw BI perpendicular to FB , and BI is the direction of the plane required. On the vertical line GF , make FM to represent the weight of the body, and complete the parallelogram $LMNF$; then FN represents the force on the wall-head, in the direction FC ; and FL the force acting perpendicular to the plane, or in the direction BF . But if the vertical and horizontal thrusts on the wall at C are required, draw NP perpendicular to FG , meeting it in P ; then the force FN is resolved into two forces, FP and PN . PN represents the horizontal part of the force, *viz.* that which pushes the wall in a direction parallel to the horizon; and FP the other part, which tends to press it downwards in a direction perpendicular to the horizon.

Example 2. Fig. 1.

Let the sloping body, $ABCD$, be supported by a wall at its lower end, D , which coincides with the surface of the body, and let G be the centre of gravity; it is required to cut a notch out of the body, at the upper end C , so that it may rest upon the top of a wall, which is made to fit the notch, and to find the pressure on the walls.

Draw the vertical line GE , from D draw DE perpendicular to DC , join EC , and make CF at right angles to it; then the notch, HCF , being cut, the body, $ABCD$, will be at rest. Then to find the pressure on the walls, complete the parallelogram $EIKL$, having a given angle DEC , and its diagonal on the given line EG . Then if KE represent the weight of the body, IE will represent the pressure in the direction DE , upon the wall at D , and LD the pressure in the direction CE . The horizontal and perpendicular pressures upon each wall may be found, as in the preceding example, by resolving each of the forces, IE and LE , into two; one of which is perpendicular to the horizon, and the other parallel to it.

Scholium.—It must be observed in this example, that the notch, which is cut out at C , will remove the centre of gravity nearer to the lower end D , and consequently alter the slope CF ; but as this can only be in a very small degree, the equilibrium will hardly be affected by it, when the notch is very small.

Example

ROOF.

Example 3. Fig. 6.

Let one of the corners of a sloping body, *ABCD*, rest upon the top of a wall at *D*, which is quite level; it is required to find the position of a notch, cut out of the upper end *C*, so that the body may rest upon a wall made to fit the notch.

Let the small part, *FCH*, be so cut, that *CH* may be parallel to the horizon, then the body will be supported by the two walls at *C* and *D*. For draw *DI*, *GK*, and *CL*, perpendicular to the horizon, then these lines being produced, they may be supposed to meet at an infinite distance. To find the pressure on the walls: join *DC*, and produce the vertical line *KG* to meet it in *E*; then if *G* be supposed to be the weight of the body,

the pressure on *D* will be $\frac{EC \times G}{DC}$, and the pressure on *C*, $\frac{DE \times G}{DC}$.

Example 4. Fig. 5.

Let the body *ABCD* lie with its upper end against the vertical face of a wall at *C*; it is required to find the position of a plane supporting the lower end *D*, so that the body may be at rest.

Draw the vertical line *GE*, and *CE*, perpendicular to the face of the wall *CL*; join *ED*, and draw *DF* perpendicular to *ED*, then *DF* is the position of the plane required. Complete the parallelogram *EHIK*; then the pressure on *D*, and on *C*, and the weight of the body, are to one another as *EH*, *EK*, *EI*.

Example 5. Fig. 4.

To support a body *ABCD* by two props at two given points, *E* and *I*, the direction of one of the props, *EF*, being given.

Draw the vertical line *GK*, produce *FE* to *K*, and draw *KIH*; and *IH* is the prop required. On the vertical line *GK*, take *KM* to represent the weight of the body; and on *KM*, as a diagonal, describe the parallelogram *KL MN*; then *KL* is the compression of the prop *EF*, and *KN* the compression of the prop *IH*.

In order to be understood by the reader, it will be necessary to explain such terms as are used in the subsequent part of the article, by way of definitions.

Wall-plates are pieces of timber laid on the wall, in order to distribute the pressure of the roof equally, and to bind the walls together. These are sometimes called *raining-plates*.

Trusses are strong frames of carpentry, generally of a triangular form, supporting the covering. They are disposed at equal distances, and are used when the expansion of the walls is too great to admit of common rafters alone, which would be in danger of being bent or broken by the weight of the covering, for the want of some intermediate support. They are variously constructed, according to the width of the building, the contour of the roof, and the circumstances of walling below, &c.

Tie is any piece of timber connected at its extremities to two others, acted upon by opposite pressures, which have a tendency from each other; or to extend the tie, as rope or chain.

Straining-piece is any piece of timber, connected at its extremities to two others, acted upon by opposite pressures, which have a tendency towards each other.

Hence a tie acts contrary to a straining-piece. A chain,

rope, or small bar of iron, may be used for the former; but the latter must always be inflexible, being in a state of compression.

Principal rafters are two pieces of timber in the sides of a truss, supporting a grated frame of timber-work over them, on which the slating or covering rests.

Purlins are horizontal pieces of timber, fixed upon the principal rafters.

Tie-beam is a horizontal piece of timber, connected to two opposite principal rafters; it answers a twofold purpose, viz. that of preventing the walls from being pushed outwards by the weight of the covering, and of supporting the ceiling of the rooms below.—N.B. The tie-beam, when placed above the bottom of the rafters, is called a collar-beam.

Common rafters are pieces of timber of a small section, placed equidistantly upon the purlins, and parallel to the principal rafters: they support the boarding to which the slating is fixed.

Pole-plates are pieces of timber resting on the ends of the tie-beams, and supporting the lower ends of the common rafters.

King-post is an upright piece of timber in the middle of a truss, framed at the upper end into the principal rafters, and at the lower end into the tie-beam: this prevents the tie-beam from sinking in the middle.

Queen-posts, two upright pieces of timber framed below into the tie-beam, and above into the principal rafters, placed equidistantly from the middle of the truss, or its extremities.

Struts are oblique straining-pieces, framed below into the king-posts or queen-posts, and above into the principal rafters, which are supported by them; or sometimes they have their upper ends framed into beams, which are too long to support themselves without bending.—N.B. Struts are often called braces.

Punchions are short transverse pieces of timber, fixed between two others for supporting them equally, so that when any force is on the one, the other resists that force equally, and if one break, the other will also break. These are sometimes called studs.

Straining-beam is a piece of timber placed between two queen-posts at their upper ends, in order to withstand the thrust of the principal rafters.

Straining-fill is a piece of timber placed at the bottom of two queen-posts, upon the tie-beam, in order to withstand the force of the braces, which are acted upon by the weight of the covering.

Camber-beams are horizontal pieces of timber, made on the upper edge sloping from the middle towards each end, in an obtuse angle, for discharging the water. They are placed above the straining-beam in a truncated roof, for fixing the boarding on which the load is laid; their ends run three or four inches above the sloping plane of the common rafters, in order to form a roll for fixing the lead.

Auxiliary rafters are pieces of timber framed in the same vertical plane with the principal rafters, under and parallel to them, for giving additional support, when the extent of the building requires their introduction. These are sometimes called principal braces, and sometimes cushion rafters.

Joggles are the joints at the meeting of struts with king-posts, queen-posts, or principal rafters; or, at the meeting of principal rafters with king and queen-posts: the best form is that which is at right angles to the struts.

Cocking, or *cogging*, is the particular manner of fixing the tie-beams to the wall-plates: one method is by dovetailing, and the other is by notching the under side of the tie-beam,

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and cutting the wall-plate in a reverse form to fit it. This method is far preferable to the other, as it is not liable to be drawn, which the other is very subject to, when the timber shrinks.

Ridge-tree is a piece of timber fixed in the vertex of a roof, where the common rafters meet on each side of it; the upper edge of it is higher than the rafters, for the purpose of fixing the lead which goes over it to cover the ends of the slates in the upper course.

Straps are thin pieces of iron running across the junction of two or more parts of a truss or frame of carpentry, branching out from the intersection in the direction of the several pieces, for the purpose of securing them to each other. They ought always to be double, *viz.* one strap on each side; and their ends strongly bolted to each of the pieces.

The uses of the various parts are illustrated as follows; and here it may be proper to observe, that though every one of the parts above defined may be found in the same roof, it is not necessary that a complete roof should have all these parts; the introduction of many of them depends on the distance of the walls, the contour of the roof, the partitions below, the quantity of head-room wanted in the garret-rooms, &c.

Of common roofs, the simplest construction is that which consists of two rafters, *AB* and *BC*, *Plate XLII. fig. 8*; *D* and *E* are wall-plates, on which the feet *A* and *C* of the rafters rest; the bottom of the rafters is cut in the form of a right angle (called by workmen a bird's mouth), reversed to the wall-plate, and is fixed to it with nails; but this form can only be applied to buildings that have their walls at no great distance from each other.

The next form is that of having two rafters, *AB*, *BC*, *Plate XLII. fig. 7*, a collar-beam *DE*, with two wall-plates, *F* and *G*, below. This form will admit of a greater distance between the walls than the other: the beam is placed in the situation *DE*, in order to give head-room within; but when the span, *FG*, of the walls is considerable, the parts *AD* and *CE* being considered as levers, and acted upon by the re-action of the walls, the rafters are either liable to be broken at the points *D* and *E*, or curved with a concavity on the upper edges.

The third form of common roofs consists of two rafters, *AB*, *BC*, *Plate XLII. fig. 10*, a tie-beam *AC*, for preventing the rafters from pushing out the walls, a collar or straining-beam *DE*, and two puncheons, or studs, *FG* and *HI*, for keeping the rafters straight: this construction is used for cheapness, and may be executed with safety in houses not exceeding forty-five feet wide; but it is necessary to have partitions immediately below, or at no great distance from the studs. Instead of supporting every opposite pair of rafters, as in this example, in many roofs of this construction, the rafters take the place of principals, and are fixed at 7, 8, 9, or 10 feet from each other, and purlins run over the heads of the puncheons at *K* and *L*; and at the ends of the collar-beams at *M* and *N*, between every two rafters, small rafters are fixed to the purlins, the wall-plates at bottom, and the ridge-tree at the top.

The most simple construction of a truss is that consisting of the following parts, *Plate XLII. fig. 9*. *AB* the tie-beam, cocked upon the wall-plates *C* and *D*; *EK* the king-post; *AG* and *BH* principal rafters, fixed to the king-post at the joggles, *G* and *H*; *LM* and *NO* struts, mortised into the rafters at *L* and *N*, and joggled to the king-post at *M* and *O*. Other names of timbers will be fully illustrated by the descriptions of other roofs in due order of succession. What has been said may suffice for the present.

PROP. III.

The position of several rafters, *AB*, *BC*, *CD*, *DE*, &c. *Plate XLIII. fig. 1*, being given in a vertical plane, joined together and moveable about the angular points *B*, *C*, *D*, *E*, &c. while the points *A* and *G* remain stationary; it is required to find the proportion of the forces at the angles, so that the rafters may be kept in equilibrio.

Through the points *B*, *C*, *D*, *E*, &c. draw the vertical lines *Bi*, *Cm*, *Dp*, *Es*, &c. being the direction of the forces. Make *Bi* of any indefinite length, and complete the parallelogram *Bbik*. Make *Cl* equal to *Bk*, and complete the parallelogram *Clmn*. Proceed in this manner with all the remaining parallelograms, making the two opposite forces in the direction of each rafter equal to each other, and the diagonals, *Bi*, *Cm*, *Dp*, *Es*, &c. will represent the forces required, as is evident from the construction. Then, to find the proportion of the weights upon any two angles, the sine of any angle is the same with the sine of its supplement, therefore the sine of the angle *ABC* is the same as the sine of *Kbk*, or *Bki*; and the sine of *BCD* the same as the sine of *Cnm*; likewise the sine of the angle *Cml* is equal to the sine of the alternate angle *mCn*, and the sine of the angle *Dpo* is equal to the sine of the angle *pDq*; moreover, the sine of the angle *iBk* is equal to the sine of the angle *mCl*, and the sine of the angle *mCn* is equal to the sine of the angle *pDo*, and so on: then, because the sides of triangles are as the sines their opposite angles, it will be by trigonometry,

$$\begin{aligned} Bi : Bk, \text{ or } Cl :: S \cdot Bki, \text{ or } ABC : S \cdot Bik, \text{ or } iBb \\ Cl : lm, \text{ or } Do :: S \cdot Cml, \text{ or } mCn : S \cdot mCl, \text{ or } iBk \\ Do : op, \text{ or } Er :: S \cdot Dpo, \text{ or } pDq : S \cdot pDo, \text{ or } mCn \\ Er : sr, \text{ or } Fu :: S \cdot Esr, \text{ or } vFu : S \cdot sEr, \text{ or } pDq \\ Fu : Fv :: S \cdot Fvu, \text{ or } vFw : S \cdot vFw, \text{ or } EFG \end{aligned}$$

$$\text{Therefore } Bi : Fv :: S \cdot ABC \times S \cdot vFu \times S \cdot vFw \\ : S \cdot iBb \times S \cdot iBk \times S \cdot EFG$$

$$\text{Therefore } Bi : Fv :: \frac{S \cdot ABC}{S \cdot iBb \times S \cdot iBk} : \frac{S \cdot EFG}{S \cdot vFu \times S \cdot vFw}$$

That is, the weights on any two angles are as the sines of these angles directly, and reciprocally as the product of the sines of the two parts of these angles, divided by the vertical lines.

Cor. 1.—Hence the weights on any two angles are as the sines of the angles directly, and as the product of the cosines of the two parts of these angles reciprocally. For draw *BH* perpendicular to *Bi*, and produce *iB* and *AB* to *I* and *K*; then will the angle *KBI*, equal to the angle *HBi*, be the cosine of the angle *HBK*; *viz.* the cosine of the angle of elevation of the rafter *AB* above the horizon; and because *CBI* is the supplement of *iBC*, the angles *CBI* and *CBi* have the same sine, and the angle *CBI* is the cosine of the angle *HBK*; *viz.* the angle of elevation of the rafter *BC*.

Cor. 2.—Hence also, the weights on any two angles are as the sines of the angles directly, and as the products of the secants of elevation jointly, because the secants of any two angles are reciprocally as the cosines of these angles.

Cor. 3.—The force which any rafter makes in its own direction is as the secant of its elevation. For make *AP* equal to *Bb*; draw the lines *PN*, *kH*, *nL*, &c. parallel to the vertical lines *Bi*, *Cm*, &c. and draw *AN*, *BH*, *CL*, &c. parallel to the horizon; then because the angles *NAP*, *HBk*, *LCn*, &c. are the angles of elevation, and *AN*, *BH*, *CL*, &c. are all equal, if *AN*, *BH*, *CL*, &c. be considered as radii, *AP*, *Bk*, *Cn*, &c. are the secants of elevation, which also represent the forces on the rafters.

Cor. 4.—Hence the horizontal pressures at *A* and *G* are equal;

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equal; for all the perpendiculars drawn from the opposite angles of each parallelogram to meet the vertical diagonal, are all equal.

Cor. 5.—Hence, if the position of any two rafters, and the proportion of the weights, be given, the position of the remaining rafters may be determined.

Cor. 6.—If the vertical line SDV be drawn, the horizontal line AVG , and the lines AS, AR, AQ, AT , &c. be drawn parallel to the rafters AB, BC, CD, DE , &c. meeting the vertical line in S, R, Q, T ; then will AS, AR, AQ, AT , represent the forces, and SR, RQ, QT , the forces upon the angles; for AS, AR, AQ, AT , &c. are the secants of the elevation, and the triangles ASR, ARQ, AQT , are all similar to the triangles bBi, lCm, oDp , &c.

Cor. 7.—In every roof kept in equilibrio by the weights of the rafters, if U, V, W , &c. be the centres of gravity of the rafters, and also represent their weights; then the weight pressing vertically on B , will be $\frac{AU \times U}{AB} +$

$$\frac{VC \times V}{BC}, \text{ and the weight on } C = \frac{VB \times V}{BC} + \frac{WD \times W}{CD}$$

and so on; hence $\frac{AU \times U}{AB} + \frac{VC \times V}{BC} : \frac{VB \times V}{BC} + \frac{WD \times W}{CD} :: \frac{S \cdot ABC}{S \cdot bBi \times S \cdot iBk} : \frac{S \cdot BCD}{S \cdot lCm \times S \cdot mCn}$.

Cor. 8.—Hence, if the rafters be prismatic figures, the weights on the angles B, C, D , &c. will be respectively as $\frac{AB + BC}{2}, \frac{BC + CD}{2}, \frac{CD + DE}{2}$, and so on.

PROP. IV.

Given the vertical angle of a roof, and the proportion of the rafters on each side, to describe the roof to a given width, so that it shall be in equilibrio.

Let the proportion of the rafters from the top downwards be as 2, 3, 4, that is, as 4, 6, 8; then the weight on the vertical angle is $\frac{4+4}{2} = 4$; on the next succeeding angle $\frac{4+6}{2} = 5$; and on the bottom angle $\frac{6+8}{2} = 7$.

(*Plate XLIII. fig. 2.*) Now let ABC be the given angle. Make BA equal to BC ; join AC , and draw DBE perpendicular to AC ; then make DB to represent half the weight of the vertical rafter: let BD be divided into two equal parts; make BM five of these parts, and ME seven; join MA, MC, EA, EC ; then from any scale of equal parts, make BF and BG each two parts; draw FH and GI parallel to MA and MC , and make FH and GI each equal to three equal parts of the same scale. Lastly, draw HK and IL parallel to EA and EC , and make HK, IL , each equal to four equal parts; then KH, HF, FB, BG, GI, IL , are the rafters, in the proportion required.

How to reduce this proportion of figure to a given width is obvious; it is only drawing a figure, having a given side in the same proportion as another.

PROP. V.

The angular points at the meeting of every two rafters of a roof in equilibrio, by equal weights hung at the angles in vertical directions, equidistant from each other, are in the curve of a parabola.

Let $ABCDE$, &c. (*Plate XLIII. fig. 3.*) be kept

in equilibrio by equal weights, suspended at the angular points B, C, D, E , &c. in the equidistant directions BF, CG, DH, EI , &c. the points A, B, C, D, E , &c. are in the curve of a parabola.

For let BF meet AN at F . Draw AK parallel to DE , AL parallel to CD , and AM parallel to BC , cutting FB at K, L, M . Draw BQ, CP, DO , parallel to AN , cutting the middle line IE at Q, P, O .

Then, because the weights on the angles are equal, FK, KL, LM, MB , are also equal, the first excepted, being half, or as the numbers 1, 2, 2, 2; therefore FK, FL, FM, FB , are as the odd numbers 1, 3, 5, 7; but because of the equidistant lines BF, CG, DH, EI , &c. and the parallels DO, CP, BQ, AI , the triangles AFK, AFL, AFM , are respectively equal and similar to the triangles DOE, OSD, BRC ; therefore KF is equal to EO, LF equal to DS , and DS equal to OP, MF equal to CR , and CR equal to PQ : and lastly, BF is equal to QI ; therefore EO, OP, PQ, QI , are to one another as the numbers 1, 3, 5, 7; and EO, EP, EQ, EI , are as the square numbers 1, 4, 9, 16; but the lines OD, PC, QB , are to one another as 1, 2, 3, 4; therefore the abscisses EO, EP, EQ, EI , are as the squares of the ordinates OD, PC, QB, IA , and the points A, B, C, D, E , are placed in the curve of a parabola. In the same manner it may be shewn, that this is the case, whatever be the number of ordinates.

Corol.—Hence a roof of this construction may be described to any given height and vertical angle, or to a given width and height, with any number of rafters on each side.

Example.—To describe a roof with any given number of rafters on each side to a given width and height, so that all the vertical lines passing through the angular points of the rafters shall be equidistant, and the rafters in equilibrio.

Let there be four rafters on each side, (*Plate XLIII. fig. 3.*) Let IN be half the width, and IE the height. Draw NT and ET parallel to IE and IN ; divide NT into four equal parts Nf, fe, ed, dT , and draw dgE, ebE, fiE ; likewise divide IN into four equal parts Ic, cb, ba, aN , and draw cg, bh, ai , parallel to IE . Join Eg, gb, bi, iN , and these lines will be the rafters of half the roof required.

For let CB (*Plate XLIII. fig. 4.*) be the height, and AB half the base. Draw CD parallel to AB , and AD parallel to BC . In AB take any point a , and divide AD , so that bD may be to AD as Ba to BA . Join bC , draw ac parallel to BC , meeting bC at c ; and cd and be parallel to AB , cutting BC at e and d , then the triangles Cdc and Ceb are similar.

Therefore $Cd : Ce :: cd : eb$, or AB
And by construction, $Ce : CB :: aB$ or $cd : AB$ or be
Therefore $Cd : CB :: cd : AB^2$

Therefore the point C is in the curve of a parabola.

Another method may be as follows: Let BE (*Plate XLIII. fig. 4.*) be half the width, BC the height. Produce BC to F , making CF equal to CB . Divide CF into four equal parts, Cf, fg, gh, hF , and join fE, gE, hE . Divide BE into four equal parts, Bi, ik, kl, lE , and draw the lines im, kn, lo , parallel to BC , cutting the former lines fE, gE, hE , at m, n, o ; the points m, n, o , are in the curve of a parabola. For the principles of this construction, the reader may consult Theorem VII. p. 123. vol. ii. Hutton's Mathematics.

PROP. VI.

To describe a roof with four equal rafters, that shall be
in

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in equilibrio by the weight of the rafters; of a given width $A E$, *Plate XLIII. fig. 5*, and height $F C$.

Join $E C$, and bisect it in H , by a perpendicular $D H G$, meeting $A E$ in G ; on G , as a centre, with the distance $G E$ or $G C$, describe the circle $C E O$. Draw $K H I$ parallel to $F E$, meeting the vertical line $O C$ in K , and the circle in I . Draw $I D C$, and join $D E$; then make the side $C B A$ similar to $C D E$, and $A B, B C, C D, D E$, will be the rafters of the roof required.

For complete the parallelogram $C D Q B$, and join $B D, I F$, and draw $C L$ perpendicular to $C F$, and equal to $F G$. On L , with the distance $G E$, describe the circle $N I F$, meeting the vertical line at N and F ; produce $E D$ to meet it also in M , and $B C$ to P .

Then because $K F$ is equal to $K C$, and $R C$ equal to $R Q$, the triangles $C I F$ and $C D Q$ are similar; therefore $I F$ is parallel to $D Q$; and because the two segments $N I F$ and $C E O$ are equal to one another, the angle $N I F$ is equal to the angle $C E O$, equal to twice the angle $C E F$, or twice the alternate angle $E C L$ equal to $E C D + D C L$, but $E C D$ is equal to half the external angle $M D C$, and $D C L$ is half the angle $D C P$ equal to $C D Q$. Therefore the angle $N I F$ is equal to the angles $M D C + C D Q$ equal to the angle $M D Q$, and $C F : C N :: C Q : C M$; but $C F$ and $C N$ are equal, therefore $C Q$ and $C M$ are equal; but $C Q$ is to $C M$ as the weight on C is to the weight on B ; therefore the weights on C and B are equal, and the rafters $A B, B C, C D, D E$, are in equilibrio.

PROP. VII.

Suppose it were required to construct a curb roof, the bottom rafter being in proportion to the upper rafter, as 2 to 3, and to a given vertical angle at the top, and to be of a given width $A B$, *Plate XLIII. fig. 6*.

Now the weight on the upper angle is to the weight on the lower angle, as $\frac{2 H I}{2}$ is to $\frac{H I + I A}{2}$, that is, as

$\frac{3 + 3}{2} = 3$ is to $\frac{3 + 2}{2} = 2\frac{1}{2}$; this is in the proportion of 6 to 5, or the half weight at H is to the bottom weight at I , as 3 is to 5.

Bisect $A B$ by the perpendicular $C D$, and make the angle $A E C$ equal to half the vertical angle, or the angle $E A C$ equal to its complement. Make $E D$ to $E C$ as 5 to 3. Join $D A$ and $D B$. Take $A G$ of any length; draw $F G$ parallel to $A E$, and make $A G$ to $G F$ as 2 to 3. Draw $A F H$, meeting $C D$ at H ; and $H I$ parallel to $F G$ or $E A$, cutting $A D$ at I ; make $B K$ equal to $A I$, and join $K H$; then $A I H K B$ is the contour of the roof required. This is so evident from its construction, that it does not require demonstration.

PROP. VIII.

In any roof constructed with two equal rafters only; as the height of the roof is to half the breadth of the building, so is half the weight of the roof to the horizontal thrust, or lateral pressure.

Let $A B C$, *Plate XLIV. fig. 1*, be a roof, having the two equal rafters $A B, B C$; join the bottom of the rafters $A C$; draw $B D$ perpendicular to it; complete the parallelogram $B E F G$, and draw $E G$, cutting $B D$ in H . Then, because the triangles $B H E$ and $B D A$ are similar, $B D : D A :: B H : H E$.

Cor. 1.—Hence, in a roof with two rafters and a tie-beam at the bottom, the tension, $H E$, of the tie-beam is

$$= \frac{D A \times B H}{B D}.$$

Cor. 2.—Hence, also, $B D : B A :: B H : B E$, that is, as the height of the roof is to the length of the rafter, so is half the weight, represented by $B H$, of the roof to

$$\text{the compression of the rafters} = \frac{B A \times B H}{B D}.$$

Cor. 3.—Half the weight of the roof, the tension of the tie-beam, and the compression of the rafters, are to one another as the height of the roof, half the breadth of the span, and the length of the rafters; for the triangle $B H E$ is similar to the triangle $B D A$.

PROP. IX.

If a rafter bear any weight, or have a weight uniformly diffused over it, the force tending to break it is equal to the cosine of elevation, multiplied into the weight, divided by radius.

Let $A B, B C$, *fig. 2*, be two equal rafters; join $A C$, draw $B G$ perpendicular to it, meeting it in G ; and let the weight W be suspended by the string $D E$. Draw $D F$ perpendicular to $A B$, and $E F$ parallel to it; then if $D E$ represent the weight, $D F$ will represent the force tending to break the rafter; $F E$ its tendency to push it from B towards A .

Now, because $E F$ is parallel to $A B$, the alternate angles $A D E$ and $D E F$ are equal, and the angles $D F E$ and $A G B$ are right angles; the triangles $D F E$ and $B A G$ are similar; therefore $A B : A G :: D E : D F$

$$= \frac{A G \times D E}{A B}, \text{ that is, as radius is to the cosine of elevation, so is the force employed to its tendency to break the rafter, that is, as } R : \text{cof.} :: D E : D F = \frac{\text{cof. elevation} \times D E}{R}.$$

Cor. 1.—Hence the weight employed, the pressure in a direction of the length of the rafter at A , the tendency to break it, are as radius, the sine, and cosine of elevation.

Cor. 2.—Because $D F = \frac{\text{cof. elevation} \times D E}{R}$, and because the stress is as the length when the weight is given, the stress is as the cosine of elevation multiplied into the weight, and this product multiplied into the length of the rafter, the radius being a constant quantity.

PROP. X.

To prevent the rafters of a roof, with a tie-beam, from bending in the middle, and to remove lateral pressure from the walls, when there is no beam.

A variety of methods may be used for this purpose; but the best are those where the shortest and least quantity of timber are employed without producing a transverse strain upon any part. When a roof consists of two rafters only, no part of the rafters can be loaded between their extremities, nor indeed will they bear their own weight without producing a concavity on the upper side, which will be greater as the length of the rafter and weight applied to it are greater. Now because the shorter the rafters are at the same elevation, the greater the weight they will bear, and be more able to support their own weight; the thing to be done is to support them by a sufficient number of fixed

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points either from the roof itself, or other immoveable places. There are three points for this purpose; if the rafters have a tie-beam below, that is, at the vertex, and at the two extremities of the rafters, the triangle being immoveable at the angles, every force applied there tends either to compress or extend the sides of the frame without transverse strain.

Examples.—Let it be required to divide each of the rafters into three equal lengths, in order to support two purlins on each side; this may be done, as in *fig. 3*, by pieces, C E, C D, A G, A F, reaching from the two lower angles C and A, and to the opposite sides of the rafters A B and B C, intersecting each other at H and I, and halved upon each other at these intersections: this mode prevents the rafters from sagging, but does not afford any support to the tie-beam. The meeting of so many braces at the same point, too, gives little opportunity of making the ends entirely secure, even though assisted by iron straps. Another mode may be by introducing a king-post, B K, *fig. 4*, to which the struts D H, E I, F M, G L, may be firmly joggled at H, I, M, L, and mortised to the rafter at D, E, F, G: this method keeps up the middle of the beam, but when the roof is low, and the span great, the struts, D H and F M, require themselves to be supported, and are much too oblique to prevent a change of figure.

Another method may be as in *fig. 5*, with the king-post in the middle, as before, two queen-posts under the rafters at E and F, two struts, H E and I F, joggled to the bottom of the king-post at H and I, and to the top of the queen-posts at E and F; and in order to secure the points N and P, two other braces, N Q, P R, are joggled to the bottom of the queen-posts at Q and R, and mortised into the rafters at the upper end. This construction supports the tie-beam in three different points, and each of the rafters in two. The timbers are much shorter than those of the preceding; but so many joggles are certainly an objection to this method, as the shrinking of the timber must be very considerable in three breadths, which would allow the roof to descend. When the span is great, and the points to be supported many, an excellent method may be as in *fig. 6*, where there are two arches of cast-iron or good English oak introduced, which abutt on the king-post, and at the other extremity at the ends of the beam. The rafters and the beam by this mode may be supported by as many equidistant points as we please.

When the tie-beam is removed from the bottom, as in *fig. 7*, and no fixed points are to be found from below, a longitudinal truss may be constructed, the end of which is shewn at A B, and the manner of framing it in *fig. 9*, the two ends being supposed to be firmly fixed into the gables; but where the length is great, the form of *fig. 10*, with a parabolic arch, would be much better: by this method, the rafters will be kept nearly in the same plane, and all lateral pressure from the walls will be removed; for it is evident that if the ridge-tree is supported, there can be no motion downwards in the direction of the rafters, the whole roof being hung to this longitudinal frame.

PROP. XI.

If a roof be constructed with two equal rafters, A M, C M, (*fig. 8*.) and if a tie extend from the bottom of each rafter to an intermediate point in the opposite rafter, and the ties halved together at their intersection B, forming with the rafters a quadrilateral M D B E at the vertex, and two triangles A D B and C E B; then if M D is equal to M E, and if C P represent the direction and quantity of force

on the wall at C, the force tending to break the rafters at D and E is
$$\frac{S. PCK \times S. DME \times LK \times DM}{S. LCK \times R}$$

For complete the parallelogram P C L K; make M N equal to C L, and draw N O parallel, and M O perpendicular to A M. Now the triangles C B E and A B D may be looked upon as solid levers, (at least with regard to forces applied to the angles,) moveable round B. Then the force C P will communicate the force C L to the rafter, and C L is the power acting obliquely at M, upon the rafter A M: then because N O is parallel, and O M perpendicular to A M. O M is the force tending to break the rafter at D; O N that pushing it towards A: let M N be considered radius, then O M will be the sine of the angle D M N, or D M E; for produce A M to Q, and the angle N M Q will be the supplement of the vertical angle D M E, therefore the sine of N M Q, equal to the sine of the angle M N O, is the same with the sine of N M A; then by trigonometry,

$$LK : LC :: S. LCK : S. CKL \text{ or } S. PCK \\ NM \text{ or } LC : MO :: R : S. DME = S. MNO \\ \text{Therefore } LK : MO :: S. LCK \times R : S. PCK \times \\ S. DME.$$

$$\text{Hence } MO = \frac{S. PCK \times S. DME \times LK}{S. LCK \times R} = \text{the}$$

force acting perpendicular to A M at M, but the force tending to break the rafter at D, is as the lever D M multiplied into this force; that is =
$$\frac{S. PCK \times S. DME \times LK \times DM}{S. LCK \times R}$$

Corol. 1.—Hence, if the angle D M E is a right angle, the force tending to break the rafter at D will be
$$\frac{S. PCK \times LK \times DM}{S. LCK}$$

Corol. 2.—Hence the rafters of every roof of this construction must sag in a greater or less degree, by the action of the rafters against each other at the point M, that is, they will be bent into curves concave on the upper edges; but if a diagonal connect the two vertical points M and B, this change of figure will be prevented.

PROP. XII.

To remove the lateral pressure of a roof without any intermediate beam, brace, or strut.

Let A B, B C, (*Plate XLV. fig. 1. N^o 2.*) be two rafters, and let there be constructed a strong wall-plate D E F G, N^o 1, firmly bolted together at the angles; then if the roof is to be gable-ended, after having fixed the rafters to a common ridge-tree, let two curves be made of cast-iron, or good English oak, of a parabolic form, and let into the rafters, either on the upper or under surface, and firmly secured to them by bolts or nails, and at their lower extremities to the angles of the wall-plates, the vertex of each curve meeting the ridge-piece on each side of it, or nearly, as may be found convenient. One half of the plan N^o 1. exhibits the form for the execution of a gable-ended roof, and the other for a hiped roof. The two sides, laid in plano for each form, are shewn in N^o 3 and 4; at H I K L and M N O P, H L and D G represent the same wall-plate; D G, N O, and E F another wall-plate, I K and M P meeting the ridge on each side of it: but it must be observed, when the roof is to be hiped, that the ridge-tree must be very strong, as the compressure will be very great, the hip-rafters acting like powerful braces at the extremities of it. Hence it is evident that the wall-plates act as the tie-

beams

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beams of a common roof, and the curves as the rafters, or more naturally like an arch of a bridge in equilibrium. It has already been shewn that equal weights, acting in equidistant lines, require an arch of a parabolic form to keep them in equilibrio. In this it is to be considered, that as the arches are placed with their crown upwards, they are in a state of compression, and may be got out very conveniently in several lengths; but if the arches were inverted they would be in a state of tension: each arch must then be in one piece; the ridge would be compressed by the tension of the two curves. This inverted disposition of equilibration is not so secure as when the crown of the arches either meets the ridge or lies towards it. Though the above construction will prevent lateral pressure, it will not hinder the rafters from sagging; but the addition of a collar-beam will effectually answer this purpose in all moderate spans.

PROP. XIII.

Given the construction of a roof, of which not more than three timbers meet at the same junction, and a force in the direction of any one of the timbers; to find the forces communicated to the other timbers, so that the roof shall be in equilibrio.

Begin with the given force, and take a part of the line of its direction from the junction to represent it; then with the other two directions complete a parallelogram, and apply them from the next junctions on the same straight line from which they were taken, and complete parallelograms as before. Proceed in this manner from one junction to another, until parallelograms have been made at every junction. Then the parts of these parallelograms in the directions of the timbers are the forces in these directions; then to know the state of tension or compression of any timber, observe that when two of the angles formed by three directions are less than two right angles, the middle force acts always contrary to the two extreme ones, as has already been explained; and that when any two of the angles of direction are greater than two right angles, then the forces will act towards or from the same point.

Example 1.—Let ABCDA (*fig. 2.*) be a roof, consisting of two rafters, AB, BC, two beams, CD, DA, and a king-post, DB, supported by the walls AO and CE. Let CE represent half the weight of the roof, or the re-action of the wall CE; complete the parallelogram C E F G; make DL equal to FC, and complete the parallelogram LMND, then CF or DL is the force in the direction of the beam CD or AD, and DM the force in the direction of the post DB; then because the angles ECF and FCG are less than two right angles, and because the point C is pressed by the re-action of the wall EC, it will also be pressed by the force GC, and drawn by the force CF; therefore the beam CD is in a state of tension, and the rafter BC in a state of compression. Again, because CDB and BDA are greater than the two right angles, and because CD is in a state of tension, BD and DA are also in a state of tension.

If BH be made equal to GC, and the parallelogram BHIK completed, and if BP be made equal to DM, then will PI be equal to twice CE, the pressure on the walls.

Example 2.—Let ABCDEA (*fig. 3.*) be a roof supported by walls in the direction PA and QC, and let there be two pieces of timber, BD and BE, connecting the angular points D and E to the ridge at B.

Take CF to represent half the weight of the roof, or the re-action of the wall QC: complete the parallelogram

CFGH, produce CD to K, make DK equal to GC, and complete the parallelogram DIKL; then GC or DK is the force in the direction of the timber CD or AE, and is in a state of tension, because the angles FCG and GCH are less than two right angles, and because CF is in a state of compression; CH, the force in the direction of the rafter BC, is also in a state of compression; and because any two of the three angles GDB, GDE, EDB, are greater than two right angles, and DC is in a state of tension, the two pieces, DB and DE, are also in a state of tension: that is, EA, EB, ED, DB, DC, are all ties. The force in DB or EB is DL, that in DE is DI.

If BR and BS be made equal to CH, and the parallelogram BRWS completed; and if BT and BU be made equal to LD, and the parallelogram BTUV completed, then will VW be equal to twice CF, that is, by reducing the force in the direction of the pieces BE and BD to an equivalent one.

PROP. XIV.

Given the lengths AB, BC, CD, DE, (*Plate XLVI. fig. 1.*) of the rafters of a roof and their angles of position, to find those angles that require ties, and those which require struts.

Let AB be to BC as 3 is to 4, that is, as 6 to 8, the proportion of the weight of the rafters; then if 8 be taken

for the weight of each of the upper rafters, $\frac{8+8}{2} = 8$

is the weight on the vertical angle C, and $\frac{6+8}{2} = 7$, will

be the weight on each of the vertical angles B and D, so that the weight on the vertical angle is to the weight on each of the lower angles, as 8 is to 7. Draw the vertical line BGF, and draw AG, AF, parallel to the rafters BC, CD; then if FG be to GB as 8 to 7, the rafters are in equilibrio, and require no ties. But suppose it should be found that FG is to GB as 1 to 2; now as that will keep it in equilibrio, it would then require a very considerable addition laid on the angle B to keep it from springing outwards, so that if two braces, FG and KL, N^o 2, were fixed to the rafters AB, BC, CD, DE, these braces would be in a state of compression, and if the brace HI were fixed at the top it would be in a state of tension: FG and KL only require firm buttments, but HI to be well bolted. It may here be observed, that if the vertical angle only be braced and secured to the two rafters, the whole frame will then be immoveable.

PROP. XV.

To discover the effect of bracing the angles of a roof flat on the top, supported by puncheons at the bottom of the rafters, to accommodate a semicircular ceiling within.

Let ABCDEF (*fig. 2. N^o 1.*) be the truss, divested of its braces, the bottoms of the puncheons resting firmly on the walls at A and F, and the joints at B, C, D, E, to be quite movable, like rule joints. Now, as this disposition of timbers would fall, and in falling, would assume the form of N^o 2, the angles at C and D would become more and more obtuse, while those at B and E would become more and more acute; the latter would therefore require straining-pieces, and the former ties: the straining-pieces must have good abutments, and the ties be well bolted at their extremities.

Let N^o 3 be the truss, with braces disposed in the lower angles: this disposition will bend the rafters BC, DE, and the puncheons BA, EF, convex towards the outside, which

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Is entirely occasioned by the braces G H and N O: the camber-beam C D is no otherwise affected than by its own weight. Let it now be supposed, that the angles C and D, N° 4, are braced at I K, L M. In this disposition, the puncheons B A and E F are not affected in respect of transverse strains; the rafters C B, D E, and beam C D, would all become concave on the outside; and the points B and E, at the bottom of the rafters and top of the puncheons, would be pushed out beyond the perpendicular of A and F, at the bottom: here it is necessary to observe, that the effect produced in this case on the rafters C B and D E is contrary to the effect produced in N° 3, by the braces being disposed in the lower angles. Lastly, suppose that all the angles are braced, as in N° 5, it is evident, since the braces H G, N O, produce a contrary effect to the braces K I, L M, these bending the rafters downwards, and those upwards, that the rafters C B and D E will become nearly straight, or assume an undulated line: the puncheons B A and E F, receiving the force of the braces H G and N O at the points G and O, must still be bent, so long as the under ends G and O of the braces do not coincide with the under ends A and F of the puncheons: in this case, there is no other remedy than by giving the puncheons a scantling sufficient to withstand this transverse strain, or horizontal thrust, at the points G and O: however, the shape of the contour may be pretty well secured by introducing two abutments, H I and M N, N° 6; these, by being bolted through the two ends, will add greatly to the stiffness of the rafters B C and D E: the bolts that go through the upper ends may also serve for the braces I K and L M: the shape of the horizontal beam C D will likewise be very much preserved by the piece K L, bolted in three places, one at each end, into the braces I K and L M, and another in the middle: the contour of a roof, thus supported, would be quite unchangeable, if the rafters were inflexible; but as this is not the case, and as they are acted upon transversely by the braces, the truss will, therefore, in some degree, be expanded at B and E, and consequently occasion lateral pressure on the walls; it will therefore be unfit for an oblong building, without other precautions for this purpose. By inserting parabolic curves in the sides B C and D E, as in *Plate XLVI. fig. 1*, it will be effectually prevented.

In roofs of this description, joggle-pieces of wood should never be used, as the shrinking of them would tend greatly to alter the outline of the rafters.

Having laid down such principles as will enable the workman to judge of the strength and strain of timbers in the framings of carpentry, it will now be necessary to proceed to shew the mode of constructing roofs to answer various purposes; to give some practical observations relative to their strength, and to shew the various modes of joining timbers, the forms of straps, &c.

Plate XLVII. fig. 1. is the roof of the chapel of the royal hospital at Greenwich, constructed by Mr. S. Wyatt.

	Inches Scantling.
A A, The tie-beam, 57 feet long, the span of the walls being 51 feet	14 × 12
B, Queen-pofts - - - - -	9 × 12
C, Braces - - - - -	9 × 7
D, Straining-beam - - - - -	10 × 7
E, Straining-piece - - - - -	6 × 7
F, Principal rafters - - - - -	10 × 7
G, Camber-beam for the platform - - - - -	9 × 7
H, An iron rod, supporting tie-beam - - - - -	2 × 2

The trusses are seven feet clear; the platform is covered

with lead, which is supported by horizontal beams six by four inches.

The timbers of this truss are well disposed, and perhaps contain less wood than most roofs of the same dimensions. The iron rod seems of no other utility than to prevent the middle compartment of the beam from sagging.

Fig. 2. is the roof of St. Paul's, Covent-Garden, designed by Mr. Hardwick, and constructed by Mr. Wapshot, in 1796.

	Inches Scantling.
A A, The tie-beam, spanning 50 feet 2 inches	16 × 12
B, Queen-pofts - - - - -	9 × 8
C, Straining-beam - - - - -	10 × 8
D, King-poft, 14 inches at the joggle - - - - -	9 × 8
E, Strutts - - - - -	9 × 8
F, F, Auxiliary rafters, at bottom - - - - -	10 × 8½
H, H, Principal rafters, at bottom - - - - -	10 × 8½
I, Studs supporting the principals - - - - -	8 × 8

This roof is much better constructed than the original one by Inigo Jones. A truss of the present design contains only 98 cubic feet of timber, whereas that by Inigo Jones had 273, and was very insufficient at the joggles, and had some of its timbers very ill disposed: the interior truss is well contrived for supporting the exterior, which reaches seven feet beyond the walls. The tie-beam has perhaps too much camber, being six inches; for since it acts as a string, it will lengthen in the settling of the roof.

Fig. 3. is the roof of Drury-lane theatre, 80 feet 3 inches span, and the trusses 15 feet apart: constructed by Mr. Edward Gray Saunders.

	Inches Scantling.
A, Beams - - - - -	10 × 7
B, B, Rafters - - - - -	7 × 7
C, King-pofts - - - - -	12 × 7
D, Strutts - - - - -	5 × 7
E, Purlins - - - - -	9 × 5
G, Pole-plates - - - - -	5 × 5
H, Common rafters - - - - -	5 × 4
I, Tie-beam - - - - -	15 × 12
K, Pofts to ditto - - - - -	15 × 12
L, Principal braces to ditto - - - - -	14 and 12 × 12
M, Strutts - - - - -	8 × 12
N, Straining-beam - - - - -	12 × 12

The principal beams are trussed in the middle space with oak braces, five inches square. This was requisite on account of its width, which is thirty-two feet, that the floors might carry the work-shops necessary for the use of the theatre. This truss is most admirably constructed, it is hardly equalled for strength, stiffness, and lightness by any other, and will safely bear a load of nearly 300 tons, which is four times more than ever it is likely to be loaded with.

Plate LVIII. fig. 1. is the design of a truss-roof for a church, with a nave and two side aisles. The beam of the middle compartment is kept from sagging in the middle by two strutts, resting at the bottom on pofts over the columns, and connected together at the top by a straining-piece. As the pofts firmly support the middle of the rafters, keeping these points always stationary, there will be little danger of lateral pressure from a roof of this construction. All that is wanted further is to give the rafters stiffness, by fixing other pieces from the two fixed points of the tie-beam, and from the two pofts.

Fig. 2. is a design for the truss of a curb-roof, with a door in the middle. The rafters are supported at equal distances, from

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from fixed points of the trufs; the weight of the covering being always uniform, or nearly fo.

Fig. 3. N^o 1, a defign for a roof, with lanterns in feveral ftages, diminifhing in the form of fome Chinefe buildings. Thefe towers may be carried to any height, at pleaſure, by always truſſing in the plane of the diagonal between every two ftages from the lower, to ſupport that immediately above. There are ſome excellent ſpecimens to be ſeen in the buildings of Deptford, belonging to the victualling office, called uſually the Red-houſe. N^o 2. is a plan for the feat of the upper ſtage.

Fig. 4. is the defign of a conic roof for a rotunda or circular building, ſupporting a lantern at the top. If the extent of the building is very large, the rafters would require to be ſupported in the middle; for this purpoſe the bottom piece may be continued, as is expreſſed by the dotted lines.

Fig. 5. is a defign for a pent roof, ſupporting a lantern of an octagonal form. N^o 1. is the form of the truſs; N^o 2, the lower plan, with the feat of the poſts; N^o 3, the plan of the upper part; N^o 4, the truſs of the two tranſverſe parts.

Having deſcribed the form of roofs ſupporting lanterns, and the truſſes in which they may be executed with ſafety, it will now be proper to give a few examples of domes, and ſhew how they may be conſtructed under various circumſtances. If the dome to be conſtructed be on a circular plan, and have no lantern above, the ribs may be built in the following manner, with planks of convenient lengths in three thickneſſes. Having aſcertained the length of the ribs, and the number of pieces in that length, and having properly ſhaped all the pieces to the curve, the middle piece at the bottom may be one of theſe lengths; to each ſide may be joined two other pieces, one reaching to a third of the middle piece, and the other to two-thirds from the bottom; ſo that by continuing with planks of the whole length to the other extremity of the rib, the middle thickneſs will always be covered two-thirds from the bottom on one ſide, and one-third on the other; the deficiency at the top muſt be filled up with pieces, one of a third and the other of two-thirds, as at the bottom; the whole, being well bolted together and ſtrapped acroſs the joints, will be nearly as ſtrong as a ſolid rib. *Plate LIX. fig. 1* ſhews the manner of conſtructing this kind of dome; N^o 1 being the femi-plan, N^o 2 the elevation, N^o 3 the manner of building the rib. In domes of this kind it may ſometimes be neceſſary to diſcontinue the ribs, in order to divide the ſpaces more equally for the horizontal ribs. It is evident that a dome built in this manner may be carried almoſt to any degree of extent, provided that it have a ſufficient number of horizontal ribs. Of this conſtruction is the Halle du Bled at Paris, of 200 feet in diameter, the invention of a judicious carpenter, the Sieur Molineau, a man of little education in the point of ſcience, but of conſiderable mechanical experience, from which he formed his theory. Being convinced that a very thin ſhell of timber might not only be ſo ſhaped as to be nearly in equilibrio, but that, if well connected with horizontal ribs, it would have all the ſtiffneſs that was neceſſary; he accordingly preſented his ſcheme to the magiſtracy of Paris: the grandeur of the idea pleaſed them, but they doubted of the poſſibility of its being put in practice. Being a great public work, they prevailed on the Academy of Sciences to conſider it. The members, who were competent judges, were ſtruck with the juſtneſs of Mr. Molineau's principles, and aſtoniſhed that a thing ſo plain had not become familiar to every houſe-carpenter. It quickly became an univerſal topic of converſation, diſpute, and cabal in the polite circles

of Paris. But the Academy having given a favourable report of their opinion, the project was immediately carried into execution and ſoon completed, and now ſtands as one of the greateſt exhibitions of Paris. The circular ribs which compoſe this dome conſiſt of planks 9 feet long, 13 inches broad, and 3 inches thick, made in three thickneſſes, as in that already deſcribed. At various diſtances theſe ribs were connected horizontally by purlins and iron ſtraps, which made ſo many hoops to the whole. When the work had reached ſuch a height, that the diſtance of the ribs was two-thirds of the original diſtance, every ſecond (now conſiſting of two ribs, very near each other,) was in like manner diſcontinued, and the void glazed. A little above this the heads of the ribs are framed into a circular ring of timber, which forms a wide opening in the middle, over which is a glazed canopy or umbrella, with an opening between it and the dome, for allowing the heated air to get out. All who have ſeen this dome ſay, that it is the moſt beautiful and magnificent object they ever beheld.

The only difficulty which occurs in the conſtruction of wooden domes, is when they are loaded in the upper part by a heavy lantern or cupola. Such a dome as has now been deſcribed would be in danger of being cruſhed at the top inwards; the moſt effectual method of preventing which is by making the ribs in the form of truſſes, as in *Plate LIX. fig. 2*, where the ſtraight pieces connecting the two extremities of the exterior ſide, forming as it were the baſe of a truſs in a common roof, act contrary to the nature of a tie-beam; they reſiſt the vertical preſſure of the lantern, without having any tendency to burſt out the ſides, by acting entirely longitudinally on the wall-plate. In order to ſecure the lantern, horizontal braces are fixed from the bottom of the lantern to the middle of the principal braces under the joggles, ſo that the whole is reſolved into triangles, which are all immoveable at the angles. The wall-plates ſhould be framed as the ribs of a dome, conſtructed as in the laſt example.

When a dome is to ſupport a heavy cupola of ſtone, ſuch a conſtruction as that of the cathedral of St. Paul's, London, may be employed. *Fig. 3.* N^o 1. exhibits the truſs of this dome, taken from accurate meafurement. *A a a A*, a dome of brick, two bricks thick, which, as it riſes every five feet, has a courſe of ſtrong bricks 18 inches long, bonding through the whole thickneſs. *B b b B* is a cone, built with bricks one foot ſix inches in thickneſs, for ſupporting the heavy cupola above, of Portland ſtone, which is 21 feet diameter, and near 61 feet high, and alſo the timber-work of the dome. The horizontal or hammer-beams, *C, C, &c.* being curiouſly tied to the corbels *D, D, D, &c.* with iron cramps, which are bedded into the corbels with lead, and bolted to the hammer-beams. N^o 2. ſhews more particularly the manner of tying the hammer-beams to the corbels.

This dome is boarded from the baſe upwards, and the ribs are therefore fixed horizontally, having their ſides in planes tending to the centre of the dome. The contour of the dome is formed of two circular ſegments, which meet in the axis like a pointed arch. The ſcantlings of the curve rib of the truſs are 10 inches by 11½ at the bottom, and 6 inches by 6 at top. It has a very ſtrong double iron chain, linked together at the bottom of the cone, and ſeveral other leſs ones between that and the cupola, which may be ſeen in that beautiful ſection of St. Paul's, engraved by Rooker. This dome was turned upon a centre, which was ſupported without any ſtandards from below. As every ſtory of the ſcantling was circular, and the ends of the ledgers meeting like ſo many rings, and truly wrought, it ſupported itſelf; and as it was both centering and ſcaffolding it remained for

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the use of the painter, there being a space of twelve feet between it and the dome. This machine, it is said, was original of its kind.

Roof, *Rotative*, or *Rotatory*, in *Astronomy*, is one which is made to turn round in a horizontal direction, so that its openings or doors may be directed to any azimuthal line in the concave expanse of the heavenly regions. In a transit room, where a meridian line is the only one that is wanted, a fixed roof, with trap-doors opening at different altitudes above one another, sufficiently answers the purpose of the astronomer; but in an observatory, where an instrument that measures azimuths as well as altitudes is placed; or where a good telescope, of either the achromatic refracting, or reflecting construction, is used, for viewing the stars and planets in various parts of the heavens on the same evening, a rotative roof is indispensably requisite. The construction which has been most generally adopted, and which we shall first describe, was contrived by the ingenious Mr. Smeaton, one of whose papers, of the date of 1788, now lying before us, was designed for the late Mr. Aubert's observatory at Highbury, and will supply us with materials sufficient for the purpose of illustration. In *Plate XXII. of Astronomical Instruments*, *fig. 1.* represents a section of the whole roof along that plane, which passes through the doors, or opening, that divides it into two equal portions; *fig. 2.* is the plan of the same, and serves to illustrate *fig. 1*; in both these, *a, a,* are the rafters, or door-cheeks, covered by two oblong doors meeting at the apex, and so contrived by close fitting, as to exclude the rain and snow when nicely made. An enlarged section across one of these doors is seen in *fig. 3*, and will be explained presently. The frame of the roof is covered with alternate boards of deal of a triangular shape, tongued into one another at the edges, and when perfectly put together with strong glue, and several times painted over, will be light, and will last several years; but if a coat of copper, particularly of tinned copper of Mr. Wyatt's patent manufactory, be superadded, the weight will not be considerable, and the durability will be ensured. A square foot of Mr. Wyatt's copper of the thinnest kind weighs a pound, and therefore a given number of square feet will be covered by so many pounds weight. An edge plate, formed into a circle, terminates the eaves, and conceals a strong annular support, which rests on ten rollers, five of which are seen in *fig. 1*, three as circles, and two at the extremities of the roof in section as small parallelograms. All the ten rollers are represented in the ring seen in *fig. 4*, which is united by five pairs of hinges that connect the five equal portions thereof, as seen on the plane of the ring; while each of these five portions contain two rollers seen in section, and one handle projecting inwards. The use of the hinges is to allow each of the five portions of the ring to yield to the pressure of the superincumbent roof, in order that all the rollers may be made to act in every position of the roof, in the event of any of the parts becoming distorted or partially worn. This ring, which receives the pivots of the rollers, lies intermediate between the roof and fixed circle that bears the whole weight, and is represented by the letters *b, b,* in *fig. 1*, the fixed circle or bed being denoted by the letters *c, c*; both which, in the section, appear as straight lines, though they are circles or rings, as above described, and the fixed one, *c, c,* rests on strong upright pieces, *d, d,* properly braced by frame-work, which it is not necessary to shew. From this short description the reader will now conceive that the roof is separated from the bed *c, c,* by exactly the whole diameter of the rollers, which therefore ought to be turned nicely to the same dimensions, in order to preserve the horizontal position of the ring, and to make the rollers

act smoothly, when the roof is pushed round by any force internally applied; but unless some provision is made, more than we have yet described, the roof might be pushed from its bed, and be upset; to avoid this accident a groove is made along the upper face of the annular bed *c, c,* in which the rollers move, and while all the parts of this contrivance remain unaltered by the weather, the action of the rollers is uniform, and the construction answers its purpose in a satisfactory manner: but in many instances, we learn that the work of turning a large roof, thus constructed, becomes laborious, in consequence of either the ring of rollers, or the groove in the bed, taking an elliptical shape, in a small degree, by partial shrinking or swelling in different states of the atmosphere; in which case the rollers bind in the groove, and require mechanical force to move them, in certain parts of the revolution; which force will of course strain the joints, and ultimately destroy the union of the different parts of the structure. It is, therefore, of importance that an attention be paid to the grain of the wood, as well as to its being seasoned, before the upper covering be attached; which precaution will prevent the bad effect of external moisture. At *e,* in *fig. 3.* is one of the hinges of the doors, attached first to the side of the door, and then to a piece of wood that lies over the roof to receive the screws, without penetrating the roof itself; and the crank-shape of the section of the door will explain how it clasps the door-cheeks, so as to exclude the admission of rain or snow, so long as the materials do not warp or decay. The handle-piece, *f,* pushes the door back, and brings it close again, by the aid of a staff with a hook at the end, that takes hold of the ring at the lower extremity of the handle *f,* when the roof is too far elevated for the reach of the human hand. During the perusal of this account of the mechanism of Smeaton's rotatory roof, it may have occurred to the reader, that the rollers might have been attached to the annular portion of the roof, which now rests on the upper extremities of the rollers, and that consequently the ring, that now carries the said rollers, and that is represented by *fig. 4,* might have been omitted. But the inventor had a good practical reason for the introduction of this ring, which may not yet have occurred to our reader; and it might perhaps puzzle him to discover it, without our assistance. Smeaton knew very well that the roof with rollers, or small wheels under it, would move in a groove made in the bed to receive them; but he knew, moreover, that, to move in a circular groove, the diameters of the rollers could not be great, without sticking fast against the sides of the said groove; and, also, that the pivots of the rollers must be strong, to support the whole roof. The relative diameters of the rollers, and of their pivots, on which the quantity of friction depends, would not consequently produce, under these circumstances, the easy motion of the roof that constitutes a leading object of the astronomer: the ring was, therefore, introduced, for the purpose of diminishing the friction *one-half*, without altering the necessary dimensions of the rollers, and of their pivots; which effect may be thus explained. In the first place, supposing the roof to be moving forwards on rollers attached to it, like a carriage on wheels; in this case, the velocity of the roof and of the rollers, or of the carriage and wheels, would be the same; and the horizontal distance passed over in a given number of revolutions of the roller, or wheels, would be measured by the circumference of the roller, or wheel, multiplied by its number of revolutions; and the mechanical diminution of friction would be as the diameter of the roller to that of the pivot of the axis, or of the wheel to that of its axle. When a motion is thus produced in a roof, or in a carriage,

ROOF.

A carriage, we may say that it *rides* on, or is *carried* by its roller, or wheel, and that with the same velocity with which the roller or wheel moves forwards, by virtue of its rotations. But, in the next place, let the rollers be considered as attached to the ring in *fig. 4*, which has as many holes cut through it as there are rollers for them to pass through; and let us conceive this ring to be put in motion, as it is placed on its circular bed *cc*, without any reference to the roof. In this situation, the ring rides on, or is carried by the rollers with their velocity, as the roof or carriage was on our first supposition. Let now the roof rest on wedges placed on the ring, but so as *not to touch* the rollers, and it will also ride as before, with the velocity of the rollers; but remove the wedges, and let the roof fall upon the upper edges of the rollers, and it will now have two motions combined: for, first, it will ride in common with the ring on which it rests, in the way we have described; and, secondly, it will be urged by the rollers acting on its annular face, as so many toothless pinions, with a similar velocity with which it *rides* on the rollers, along with the ring; or, in other words, the roof will have *double the velocity* of the ring on which the rollers are fixed. To understand this effect more clearly, let the reader suppose himself in an open carriage. While he sits still, he is carried with the velocity of his vehicle; but if he should venture to place his foot on the circumference of one of the wheels, in getting out, while the vehicle is in motion, he will run the risk of being tossed forward by the said moving wheel with an *increased velocity*, that will convince him of the danger of such an experiment. This effect is familiar to all, but the cause is not generally considered, perhaps but little understood.

In order that the adaptation of all the parts that are connected with the rollers may be the more evident, we have given an enlarged section of one corner of the roof, near the eaves, within the ring of *fig. 4*, which, therefore, may be considered as a separate figure, in which the same letters represent the same parts as in *fig. 1*: namely, *a* is one of the rafters, forming one of the door-cheeks, projecting above the covering of the roof; *bb*, the roller, seen both in section and plan; *c*, a section of the fixed annular bed; *g*, a section of the moveable annular part of the roof, on which the eaves lie; and *gh*, an iron cranked bar, screwed to *g* above, and therefore moving with the roof, but in such way, that the crooked part at *b* lies just below an annular piece *i*, attached to the bed *c*; so that if any blast of wind, or other external force, should move the roof, it will be secured from oversetting, by the crank-bar at *b* catching the said fixed piece *i*; and if four or more of these crank-bars be used, the roof will be secure in all directions.

The objection which we have stated, as applying to the construction of Smeaton's roof, has very lately been obviated by the Rev. W. Pearson of East Sheen, Surrey, who has just finished a rotative dome, to receive a large and very accurate circular instrument for measuring azimuths, as well as altitudes, by Troughton; which instrument was originally ordered by the Russian Academy, but was countermanded by reason of the ravages committed by the French in Russia, at the time that the construction of it was in hand. This dome is represented in skeleton in *fig. 5*, where the circular rafters are seen at sixteen equal distances, exclusive of the opening, *aa, aa*, which is nearly nine inches, through which the telescope of the instrument, placed on the top of the pillar *A*, is directed to any part of the heavens. This semicircular opening, which divides the dome into two equal portions, or quarters of an oblong sphere, is covered by five doors, two on each side, and one at the summit; but in such a way, that a small door on one

side faces a large one on the other, and the top door takes in five or six inches more on one side than on the other, so that there is no altitude to which the telescope may not be directed, by reversing the position of the dome, *i. e.* by turning it just half round, when necessary; and yet the fittings are so contrived, that any one of the doors may be opened, while the rest are shut. The two quarters of the oblong sphere are connected by brass bars at the points where the doors meet, and grooves are made on the edges of the rafters, that form the door-cheeks; so that any rain, that may be driven into the sides or ends of the doors, runs down these grooves to the eaves, and disappears, without being admitted within. We have not thought it necessary to shew these doors, which turn back on hinges, placed at their edges, upon the roof, which is covered first with triangular slips of deal about three-eighths thick, and then with tinned copper from Wyatt's manufactory; which metal being easily seamed, requires not the aid of many nails. The ornament at the top, being light, turns back with the top-door, and lies also on the roof, while observations are made in or near the zenith. The rotative part of this roof is of the simplest construction that can well be imagined, and yet is safe, and more free from friction than Smeaton's, though made with the utmost care. The ring of rollers is here entirely left out, and three large balls of lignum vitæ are substituted in a detached state, that is, without any fixed axis of motion, or pivots; and a four-sided circular tunnel is so formed of wood, that these balls, by their similarity of dimensions, keep their relative distances from one another, and act as friction-rollers both in a vertical and horizontal direction; nay, even in both at once, whenever they happen to come in contact with either of the sides of the said tunnel. The balls, which are $4\frac{1}{4}$ inches in diameter each, are shewn in *fig. 5*, at opposite diameters of the dome, near the eaves, as though four were used, for the sake of exhibiting their mode of position and action; but three only are much better, because in every situation of their revolution they are certain to bear equal shares of the whole weight, when the bed is horizontal; and therefore none of them will refuse to move, when the dome is pushed round; but should they happen to gain ground of one another in moving forwards, by any difference in their diameters, they will resume their original situations respectively during the backward motion of the dome. *Fig. 6*, is an enlarged scale of the tunnel and of one of the balls, in which *A* is a portion of the roof, terminated by the annular piece of deal *B*, which is lined with the annular piece of wainscot *C*, to both which the covering-piece *D* above the eaves is screwed; *E* is a piece of wainscot forming the inner side of the tunnel, and *G* is a continuation of one of the upright planks attached to the annular bed *H*, and forms the exterior side of the same. All the four sides of the square tunnel, which we called circular, because it surrounds the circular erection, are either of wainscot, or lined with wainscot, to come in contact with the lignum vitæ which composes the balls; though the rings of deal, *B* and *I*, might have been in contact with the balls, if they had been hard enough; but the weight of a dome, of nearly ten feet diameter, covered with copper, would, in that case, have produced hollow places, that might have impeded the uniform motion of the balls. The piece *J* is one of the supporters of the bed *I*, to which the deal planks *G* are made fast, and also the external pilasters that ornament the vertical portion of the structure. In this dome the velocity of the superstructure, as in Smeaton's, is double to that of the balls; and as these are left at liberty to turn in any direction, where an obstacle to motion is presented to any of them, they in-

stantly right themselves, and set forwards again with their load without impediment, and without groaning. A cranked bar attached to the piece E, and bending below a ring, fast to the bed I, but not shewn in the figure, prevents the dome from overturning by either accident or violence, and by the aid of a thumb-screw fixes it in any given position. This construction was, we believe, suggested first by Mr. Troughton, and as it has not been long in use, we cannot foresee what objections may hereafter apply to it; but we give the particulars of it from a persuasion, that it will be found to be a considerable improvement on Smeaton's, and that it may ultimately be generally adopted.

ROOFS, in *Rural Economy*, are formed of many different sorts of materials. Thatch was formerly almost in general use for covering the roofs of farm-buildings; but it is obviously objectionable on many accounts; it not only serves as a hiding-place for rats, mice, insects, birds, and other sorts of vermin; but it is extremely perishable in its nature, subject to be much damaged by high winds, and of course liable to frequent repairs, and, above all, highly dangerous from its combustible nature; it is, therefore, probably the most improper, the least safe, and, in the end, the most expensive material that can be employed for the purpose. Mr. Middleton, however, thinks that it keeps out the summer's heat and winter's cold more effectually than any other material now in use; but that, as it is not quite so compact and tightly as slates or tiles, and the straw being of such value for other purposes, it will probably be superseded by them. Tiles, though little exposed to danger from fire, do not, by any means, constitute a good roof, being ill calculated for preserving grain or other farm produce. In summer they admit a heat very unfriendly to hay, corn, or straw, while, in winter, they are equally objectionable, on the ground of transmitting moisture in a high degree, while slates, though more expensive at first, are liable to none of these objections, especially when of the more thick kind. A roof covered with them, therefore, answers every useful purpose, and is very durable, lasting half a century, with very slight repairs in any way.

In the Middlesex Report on Agriculture, it is remarked on this important subject, in speaking of the roofs of houses, that pantiles are so easily heated through by the sun during the summer months, that the rooms underneath are as hot as an oven; while, in the winter season, in every common frost, these tiles are so completely frozen through, as to become as cold as a covering of ice. These extremes must consequently have a very bad effect on the health of the inhabitants. The blue slates are so very thin, as to be equally liable to the same objection, particularly as they are now laid on most of our fashionable houses, under Wyatt's patent. They are rather better when laid on in the common manner, that is, on double laths, but much better on boards. Plain tiles make a considerably more temperate covering for houses than either pantiles or slates, by reason of their being laid double and in mortar, and thereby forming a much thicker and closer roof. In this they are nearly equalled by the thick or stone slating of the midland counties; they might also be glazed of a slate colour; in which case they would make a roof more handsome, temperate, and durable than any other covering material now known.

Some other substances have been had recourse to in this intention. In different parts of the country, cements of various kinds, and coarse paper laid over with resin, tar, &c. and other similar matters, have been tried, but with no very promising success as to their application. In some parts of Devonshire, though slate is by no means difficult to be pro-

cured, a substitute for that sort of covering is, Mr. Vancouver asserts, getting very much into use, which is prepared in the following manner:—three parts of whiting, five of sand, one of pounded charcoal, and one of bone-ashes, to a barrel of common tar, to which are added four pounds of black resin; the two last materials are to be melted together, and, when boiling, the other ingredients are to be added in small quantities, keeping them constantly stirred and in motion over the fire, until the whole mass becomes of a consistency fit for use. Then the roof, being previously covered over with sheathing-paper securely nailed down, is to be carefully and evenly spread with the liquid hot from the copper, to the thickness of about three quarters of an inch; which will cost, at the cauldron, about thirty-five shillings for each square of ten feet. The same measure of the common slate roof will cost about thirty-two shillings. The roofs for this sort of composition are pitched very flat, and, from the lightness of the scantling which is necessary in their construction, come considerably cheaper than those required for carrying slate or tiles.

Materials of the reed and heath kinds have also been tried as coverings for the roofs of farm-houses and cottages, in places where they are capable of being procured in sufficient quantities for such purposes; and, though they are considerably more durable than common straw thatch, they are subject to all the inconveniences and objections of that sort of covering. Indeed, no kind of material that has hitherto been made use of for forming the coverings of the roofs of buildings are quite free from imperfections of some sort or other. It is consequently a matter of great individual, as well as national importance, to be acquainted with a substance which is not liable to any such defects, as a good, cheap, and durable material of such a nature, for this use would evidently be a most valuable discovery, as such a material is still clearly wanting for this purpose.

ROOF, Attic of a. See **ATTIC**.

ROOF, False. See **FALSE**.

ROOF, Hip. See **HIP ROOF**, and **ROOF**, supra.

ROOF-Trees, or **RUFF-trees**, are the timbers, in a ship, which go from the half-deck to the fore-castle. See **ROUGH-Tree**.

The term is also used for the upper timbers of any building; whence, in the northern counties, it is common to signify a whole family, by saying all under such-a-one's roof-tree.

ROOF-Tyles. See **TYLE**.

ROOFING, in *Rural Economy*, sometimes a word applied provincially to the ridge-cap of thatched roofs. It also signifies any sort of material employed in forming the roof of a building, whether in the frame-work, or covering. In the business of roofing farm or other buildings, the chief circumstance necessary to be attended to, is that of tying the two side-parts well together, and in a safe manner, by means of the wall-plates and binding-beams; especially those erections which are of the more long kind, without any cross-walls to stiffen and support them. It has been remarked, that it is generally for want of attention to these matters that farm-buildings, as well as those of other sorts, are so frequently seen propped up with shores and buttresses; or fallen to the ground half a century sooner, perhaps, than they would have done under a better and more judicious management. And it ought, indeed, to be a general principle, or line of conduct, which every careful and intelligent manager should follow in erecting such buildings;—a principle which is equally applicable to the other parts as well as the timber and the covering: which is, that of sparing no requisite expenditure; as a few shillings, or pounds, of additional

tional cost, in the first instance, may be the saving of ten times the sum in the end.

In the work of repairing buildings of this nature, the roofing claims equally the regard of the manager, with those of the foundations and other external parts. But the inside works, in all cases, more commonly and properly demand the notice of the occupiers.

ROOGEN, in *Geography*, a town of the duchy of Courland; 36 miles E.N.E. of Piltyn.

ROOK, in *Ornithology*, a well-known bird of the crow-kind. See *CORVUS Frugilegus*.

Great care should be taken to guard against these mischievous birds at the time when the wheat is just shooting up; for they perceive it shooting much sooner than the farmer can, and are led by the shoot to pick it up. They must therefore be carefully kept off the ground until about a week or ten days after this season; for at the end of that time the blade will be grown up, and the grain so exhausted of its substance, that they will not give themselves any trouble to pick it out of the ground. They seldom or ever molest the wheat, which is sown about Michaelmas; because so much grain of the late harvest then lies scattered about the fields, that they find it much easier to pick up there, than to search for corn under ground in new-sown lands. They often do harm when the snow is going off from the green wheat towards the end of winter; for having been pinched for food during that season, they then greedily pluck up the young plants, in order to come at the remainder of the seeds still adhering to their roots; and are greatly assisted in this by the loose state of the earth at that time.

And they are also highly destructive to pea and bean crops in the early spring season, when they first appear above the ground, as they dig up the whole, both root and stem, even when considerably advanced in growth. They must, therefore, be kept off with great care. A great many contrivances have been invented to frighten them away, such as feathers stuck up, the limbs of rooks scattered about the ground, dead rooks hung on sticks, the gun, a boy to halloo, and tofs a dead rook up in the air. Mr. Tull found this last to be the most effectual. It is probable, however, that firing at them frequently with a gun is the most certain means of deterring them from doing such injuries, as they have a great dislike to the smell of gunpowder.

It is remarked by Mr. Marshall, in his *Rural Economy of Norfolk*, that the method of frightening rooks in practice there, especially when they take to patches of corn, which are lodged before harvest, is simply to stick up a tall bough in the part infested; and if a gun be fired near the place, before the bough is set up, this simple expedient seldom fails of being effectual. And that if rooks make an attack after seed-time, or when they take generally to the crop before harvest, a boy is set to scare them; they being seldom attempted to be shot at in Norfolk; where a notion prevails, and is perhaps well founded, that rooks are essentially useful to the farmer, in picking up worms and grubs; especially the grub of the cock-chaffer, which, it is believed, is frequently injurious to the meadows and marshes of that country. This opinion also prevails in other districts, and has most probably some foundation in truth, as they are often seen to follow the plough close to pick up such grubs.

It has indeed been stated, and supposed by some, that these birds do as much good by the destruction of grubs, insects, worms, and other similar sorts of animals, as they produce mischief by their attacks and ravages on the crops

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of the farmer; an instance in favour of which is noticed to have occurred on the Yorkshire side of the county of Lancaster, where it is said they wholly devoured, destroyed, and removed some sort of insects, which, like locusts, had seized upon and taken possession of the grass-plants of a large tract of grass-land in that neighbourhood in the early spring season, and nearly eat up and consumed the whole of it, to the very great alarm of the farmers of the vicinity; but which, on the first flight of the young rooks, were soon observed to be completely eaten up and destroyed, as was evident from the fresh grass quickly springing up and the surface becoming green again.

These birds are, however, in general considered as the greatest pests and plagues of the farmers in the above and some other northern districts, as they not only destroy the feed-wheat when newly sown, but drag out of the earth the spires of the grain or pulse seeds with them altogether, in the manner already suggested.

They are also, in these districts, equally destructive of the potatoe crops, both at the time of setting or putting them into the ground, and when they are coming up, as they eat and drag them out with great eagerness, thereby causing much irregularity and mischief in them. That they may sometimes, however, be useful in the above manner may readily be supposed; but they exist in such vast numbers in these, and some other parts of the country, that the ravages and injuries which they commit, very greatly preponderate over any good they are capable of performing in the ways that have been already stated.

They are, on the whole, an impudent and mischievous race of birds, with which, all the means the farmer can possibly take in the way of scaring them, are too often of very little avail. They frequently go to very great distances, so that the ravages they are productive of are of an extensive nature, and not confined to particular places or tracts of country only. The only safety for the farmer, therefore, seems to consist in the prevention of their breeding and rearing their young, and their destruction and eradication, as much as possible, in other ways. See *ROOKERY*.

ROOKE, LAWRENCE, in *Biography*, an able mathematician, was descended from a respectable family, and born at Deptford, in Kent, in the year 1623. He was educated in grammar-learning at Eton school, whence he removed, in 1639, to King's college, in the university of Cambridge, where he took his degrees. In 1650 he went to Oxford, where he had apartments in Wadham college, for the sake of improving in the society of Dr. Wilkins, and Mr. Seth Ward. He at length became a fellow-commoner of the college, and made it his principal place of residence for some years, during which he assisted Mr. Boyle in his chemical experiments. In 1652, Mr. Rooke was elected professor of astronomy at Gresham college, and in the same year he made some observations, at Oxford, on the comet which appeared in the month of December, and which observations were printed by Mr. Ward in 1653. In 1657, Mr. Rooke exchanged the astronomical professorship at Gresham college for that of geometry. He was one of the gentlemen by whose exertions the Royal Society was first formed, though he did not live long enough to see it established by the royal charter. Among the men of rank who cultivated his acquaintance was the marquis of Dorchester, who was not only a patron of learning, but very learned himself; and after the restoration, that nobleman frequently entertained Mr. Rooke as a visitor at his seat at Highgate, whence he used to bring him in his carriage every Wednesday to the Royal Society, which then met weekly at Gresham college. Mr. Rooke had always a tender constitution, and walking

from Highgate to London on a hot summer's day, he took cold, which proved fatal to him. He died in June 1662, in the 40th year of his age. He was highly esteemed by his contemporaries, as will appear from the following testimonies. Dr. Pope, in his life of Ward, bishop of Salisbury, speaking of Mr. Rooke, says he was profoundly skilled in all sorts of learning: "I durst," says he, "venture my life upon the truth of any proposition which he asserted, either in mathematics, natural philosophy, or history, for I never knew him affirm any thing positively, that was dubious. And when I have asked his opinion of an hypothesis, his usual answer was, I have no opinion. He was very modest, and sparing of his words, unless among intimate friends, and never talked idly. I may truly say I never was acquainted with any person who knew more and spoke less." Mr. Hooke places him among those who were most eminent for their knowledge and improvement of astronomy. Dr. Sprat, in his History of the Royal Society, speaks of him as "a man of a profound judgment, a vast comprehension, prodigious memory, and solid experience. His skill in mathematics was revered by all the lovers of those studies, and his perfection in many sorts of learning deserves no less admiration."

The only pieces which were published from his papers consist of "Observations in Cometam, qui mense Decembris Anno 1652 apparuit;" "Directions for Seamen going to the East and West Indies," which were drawn up at the appointment of the Royal Society, and inserted in their Transactions for 1665; "A Method for observing the Eclipses of the Moon;" "A Discourse concerning the Observations of the Eclipses of the Satellites of Jupiter;" and "An Account of an Experiment made with Oil in a long Tube." Ward's Life of the Gresham Professors.

ROOKE, Sir GEORGE, a celebrated naval commander, the son of Sir William Rooke, knight, of an ancient and honourable family in the county of Kent, was born in 1650. Though destined for another profession, a strong inclination for the sea-service induced him to enter into the navy. His first station was that of a volunteer, in which he distinguished himself by his undaunted courage and indefatigable application to business. He very soon obtained the post of lieutenant, from whence he rose to that of captain before he was thirty years of age, which was considered as a very extraordinary circumstance, at a time when no man, be his quality what it would, was advanced to that station before he had given ample testimonies of his being able to fill it with honour. These preferments he obtained during the reign of Charles II. and under his successor, James II., he was appointed to the command of the *Deptford*, a fourth rate man of war. His obligations to the Stuart family did not prevent his hearty concurrence in the revolution, and in 1689 he was appointed by admiral Herbert as commodore, with a squadron on the coast of Ireland. In this station he concurred with major-general Kirke in the famous relief of Londonderry. Soon after he was employed in escorting the duke of Schomberg's army, and landing them safe near Carrickfergus, facilitated the siege of that place, and, after it was taken, sailed with his squadron along the coast; where he first looked into the harbour of Dublin, manned all his boats, and insulted the place where king James was in person; and in the night of the 18th of September, he formed the design of burning all the vessels in the harbour, which he would certainly have executed, if the wind had not shifted and driven him out to sea. In 1690 he was, upon the recommendation of the earl of Torrington, appointed rear-admiral of the red, and in that rank he served in the fight off Beachy-Head, in which unfortunate affair it was admitted,

on all hands, that he had done his duty. He was employed twice or thrice to convoy king William to Holland, and in 1692 he was promoted to the rank of vice-admiral of the blue, when he served in the famous battle of La Hogue. This was on the 22d of May, and he behaved with such distinguished courage as to obtain the most marked applause of admiral Ruffel, it being owing to his vigorous behaviour that the last stroke was given to that important day, which threw the French entirely into confusion, and forced them to run such hazards, in order to shelter themselves from their victorious enemies. The next day was, however, still more glorious, for vice-admiral Rooke had orders to go into La Hogue and burn the enemy's ships as they lay. There were thirteen large men of war, which had crowded up as far as possible, and the transports, tenders, and ships with ammunition, were disposed in such a manner that it was thought impossible to burn them. Moreover, the French camp was in sight, with all the troops intended to have been employed in an invasion of this country, and several batteries upon the coast well supplied with heavy artillery. Notwithstanding all these preparations, admiral Rooke performed the business entrusted to him with so much skill and judgment, that he destroyed twelve ships of the line, and one fifty-six gun frigate. This desperate enterprise he effected with the loss of ten men only. The behaviour of the vice-admiral at La Hogue appeared to the king so great, and so worthy of public notice, that, having no opportunity at that time of providing for him, he settled upon him a pension of 1000*l.* per annum for his life. In 1693 the honour of knighthood was conferred upon him, and he was, at the same time, made vice-admiral of the red.

The grand fleet of the English and Dutch proceeding to sea in the month of May, Sir George Rooke was detached from it with a squadron of twenty-three ships of both nations, to convoy a large fleet of merchantmen up the Mediterranean. The French, in the mean time, had been indefatigable in repairing their losses, and with a very powerful fleet, of which the English ministry had obtained no proper intelligence, were lying in Lagos-bay, off Portugal, to intercept the combined fleet. On discovering the enemy, admiral Rooke ordered the smaller ships to make their escape into the nearest Spanish ports, and stood off under an easy sail for the protection of the rest. Two Dutch men of war, and a great number of merchant-ships, were captured: the conduct of the English admiral was, however, not only exempt from all blame, but he received the thanks of the merchants, and his promotion was not in the least impeded by this misfortune, which was owing to the mismanagement of the ministers. In 1696, having the chief command of the Channel fleet, he was ordered to prevent the Toulon fleet from getting into Brest, which, from the defective manning of his ships, he was unable to accomplish. On this account he underwent a long examination before the house of commons, but nothing appeared upon which a charge against him could be founded. He continued in command till the peace of Ryswick, in 1697. He was chosen member of parliament for Portsmouth, and in this capacity he performed the duties of his station with activity and energy; however, as he mostly voted with the Tories, great pains were taken by the opposite party to ruin him in the king's opinion; but, to the honour of king William, when pressed to remove Sir George Rooke from his seat at the admiralty, he answered resolutely, "I will not." "Sir George (continued his majesty) served me faithfully at sea, and I never will displace him for acting as he thinks most for the service of his country in the house of commons:" an answer truly worthy of a British prince, as it tends to preserve the freedom of the constitution, and the liberty

liberty of parliament. In 1700 he was sent with an English squadron, in conjunction with a Dutch one, into the Baltic, to preserve the balance of power in the North, where a confederacy had been formed against Charles XII., the young king of Sweden. Rooke bombarded Copenhagen, and a peace being effected in the course of the year, he returned. In the following year he acted as commander of the Channel fleet; and being a second time chosen representative for Portsmouth, he continued to act with the opposition. This line of conduct was considered as highly meritorious with the ministry of queen Anne, who succeeded to the crown in 1702; and when war with France was declared, he was appointed as vice-admiral of England, to an united English and Dutch fleet, in an expedition against Cadiz, the duke of Ormond being commander of the land forces. The plan failed, probably for want of a proper degree of cordiality between the sea and land-service. Soon after, sir George obtaining intelligence that twenty-two Spanish galleons, guarded by a squadron of French men of war, were arrived in the harbour of Vigo, sailed thither; and sending a detachment of his fleet, with fire-ships, into the harbour, destroyed all the enemy's men of war, and a number of galleons, and took the rest. A vast booty was brought home, and a new coinage of silver, with the stamp Vigo, was issued as a national memorial of this brilliant success. On his return home, sir George Rooke was appointed to a seat in the privy council, and an inquiry having been moved in the house of lords into his conduct at Cadiz, it was voted that he had honourably discharged his duty.

In 1704 he was appointed to the command of the fleet destined to convey to Lisbon Charles, at that time competitor for the crown of Spain. Having performed that service he proceeded to the Mediterranean, where he cruised for some time. On his return through the Straits, he was joined by sir Cloudesley Shovel with a large reinforcement, and several schemes of further service being proposed, he determined to make a sudden attempt on Gibraltar. This he carried into execution in July, and the prince of Hesse, with the land forces, being disembarked on the neck, the ships proceeded to cannonade the fortifications at the mole. The enemy were driven from their guns, and a party of seamen landing, took possession of the batteries. The governor, intimidated by this bold and unexpected action, capitulated; and that important fortress has ever since remained in the hands of the English. Sir George Rooke then proceeded to Malaga, where he encountered the French fleet under the count de Toulouse. The numbers on each side were nearly equal in ships of the line, but the French were superior in men and guns. The engagement, which ensued August 13th, was undecided, neither party losing a ship, and each returned to their own ports.

Factions now ran high in the nation; and sir George Rooke, perceiving that as he rose in credit with his country, he lost his interest with persons in power, resolved to retire from public business, and prevent the affairs of the nation from receiving any injury on his account. Thus, almost immediately after he had taken the important fortresses of Gibraltar, and beaten the whole naval force of France in the battle of Malaga, he was constrained to quit his command: and as the Tories had before driven the earl of Orford from his post immediately after the battle of La Hogue, so the Whigs returned them the compliment, by making use of their ascendancy to the like purpose with regard to sir George Rooke. After this return for the important services he had done his country, sir George Rooke passed the remainder of his days as a private gentleman, and, for the most part, at his seat in Kent. "His zeal for the

church," says the discerning Campbell, "and his strict adherence to the Tories, made him the darling of one set of people, and exposed him no less to the aversion of another, which is the reason that an historian finds it difficult to obtain his true character from the writings of those who flourished in the same period of time. For my part, I have studied his actions, and his behaviour, and from thence have collected, that he was certainly an officer of great merit; if either conduct or courage could entitle him to that character."

In party matters he was perhaps too warm and eager; but in action he was perfectly cool and temperate, gave his orders with the utmost serenity; and as he was careful in marking the conduct of his principal officers, so his candour and justice were always conspicuous in the accounts he gave of them to his superiors; he there knew no party, no private considerations, but commended merit wherever it appeared.

In private life he was a good husband and a kind master, lived hospitably towards his neighbours and left behind him a moderate fortune: so moderate, that when he came to make his will, it surprised those that were present; but sir George exclaimed, "I do not leave much, but what I have was honestly gotten; it never cost a sailor a tear, or the nation a farthing." He died in January 1708, in the 58th year of his age, and was interred in the cathedral of Canterbury. He had been thrice married, and left one son only. Sir George Rooke has merited very highly the reputation of a brave and able seaman, who maintained the honour of the British flag, at a period when its superiority was much less decided than it has been during the present reign. Stockdale's edition of Campbell's Lives of the Admirals, vol. iv.

ROOKERY, in *Rural Economy*, a term applied to a nursery of rooks, or place where they build their nests, and collect in large numbers.

There are every where in many of the northern and other counties of the kingdom, numbers of such detestable nurseries of these mischievous and rapacious vermin, where they are suffered to breed and multiply in countless multitudes, to the great destruction of the hopes of the farmer and the nation at large. If it be necessary that such repositories of mischief to the produce of the husbandman should be preserved and kept up, for the vernal sport and amusement of their proprietors, certainly some other more certain and effectual means than those of the cross-bow kind should be had recourse to for the destruction of their young, in order that they may be kept sufficiently reduced and thinned in their numbers, to obviate, in as great a measure as possible, their baneful depredations and effects on the seeds and produce of the farmer.

The rooks fly from these despicable abodes, which are the head-quarters or dwellings where they collect and repose themselves, as well as breed, to very considerable distances, in order to execute and effect their different mischievous and rapacious attacks on the newly sown or rising crops of the husbandman, as they but seldom commit so much depredation on the fields which are near home.

They collect together during the severity of the winter season, especially in the more northern districts, from the different neighbouring small rookeries to be protected in large ones, and the woods which may happen to be near them; and thus render themselves secure at this inclement period, separating in the early spring to form their nests and breed in their particular rookeries.

In Lancashire, the whole track of the Fildes, as well as some others, is beset with these destructive and impudent

birds, from the vast rookeries and woods of Rawcliff-Hall and other halls in the same neighbourhood, without the owners of them ever suspecting that they harbour and support a breed of destructive vermin, which greatly injure and lessen the agricultural produce of the county. The same is also the case in a variety of other districts of the kingdom. Therefore some steps should be taken, either by severely taxing them, or some other means, in order that the mischievous consequences of such nurseries may be lessened, or wholly prevented, by their affording the convenience of breeding and rearing of so many of these birds.

ROOKPOUR, in *Geography*, a town of Bengal; six miles N. of Kishenagur. N. lat. $24^{\circ} 28'$. E. long. $86^{\circ} 46'$.

ROOM, in *Building*. See **BUILDING**.

ROOM, *Cook*. See **COOK-ROOM**.

ROOM, *Fruit*, in *Gardening*, a place constructed for the purpose of storing and laying up different articles of the fruit kind. Rooms of this nature are contrived in many different ways, but the best are perhaps those made with drawers and shelves for containing and preserving this sort of produce in all the different kinds and states of it. An ingenious plan and contrivance of this description has lately been suggested and delineated in the second volume of the Transactions of the Horticultural Society, by Mr. Maher, who has found it, in several years' experience, extremely useful in keeping fruit, especially of the apple and pear kinds.

It is represented as consisting of a long square form, the inside of which is fitted up, from the top to near the bottom, with drawers in different divisions, according to the size of the room. The number of each of the drawers is marked upon it, and a space left opposite to each such number, for inserting the name of the particular kind of fruit it may contain.

The lower rows of drawers have close bottoms, and are termed sweating drawers, as the fruit is put into them immediately after it is gathered, in order to undergo that operation. Then, in the course of ten or fifteen days, accordingly as the apples and pears may be found to have come forward, they are sorted, and the other drawers prepared for receiving them, by covering the bottoms of them with very clean wheat straw, which has been thoroughly ventilated and rendered quite dry in the open air. The bottoms of the drawers for this purpose are to be formed in open trellis work.

It is recommended, as saving much time and trouble in running up and down stairs, to have these rooms built upon the ground surface; and that the door and window of each should have slides, in order to admit a free circulation of air, when the weather is fine; but in damp days, or when it rains, the rooms should constantly be kept shut up in a close manner.

It is also advised, that a slate and pencil should hang in the rooms, the former of which should be divided into seven different columns, in which may be put down what fruit is delivered out each day in the week, for the satisfaction of families and servants.

Where these kinds of rooms are constructed with shelves, they should be formed of such sorts of wood as communicate no bad smells or tastes, and have thin slips of boards fastened on their fore parts to prevent the fruits from falling off from them. Some advise their being covered all over with a very coarse canvas, in order to prevent any sort of injury in the above way. The fruit is then to be laid singly in rows all over the surfaces of the shelves after being well dried, but never heaped over each other. Some

cover it by means of the same sort of canvas or by paper, taking care to turn it, and remove all that is damaged, two or three times during the winter season.

When the fruit is first laid upon the shelves, the earliest should be put upon the lowest shelves, and so on to the highest in their proper order. As this requires much time in many instances, it should always be done at every leisure period.

Many, however, think it the best way of keeping fruit, to first put it in glazed earthen pans, well packed and clofed with covers, which are then to be placed on the shelves in these drying rooms.

These sorts of rooms should constantly be placed in the most convenient situations, and contiguous to the rooms designed for other sorts of garden produce.

ROOMS, *Flight of*. See **FUGUE**.

Rooms in houses might be warmed by the steam of boiling water conveyed in pipes along their walls. See *Phil. Transf.* N^o 476. p. 370. seq.

This contrivance is a copper with a still-head, and a lead or copper pipe fixed to this head, which conveys the hot steam of the boiling-water through the different rooms intended to be warmed.

ROOMS, in *Ship-Building*, the different vacancies between the timbers, and likewise those between the beams, as the mast-rooms, capstan-rooms, hatch-rooms, &c. Also the different apartments or places of reserve, of which there are a number in a ship, as the bread-room, an apartment in the hold abaft for containing the bread for the ship's use. The spirit-room is adjoining the after-hold, to contain the spirituous liquors for the ship's use. The captain's and lieutenant's store-rooms are two apartments built next each other on the starboard side of the after platform abaft, for those officers to stow their wine, &c. in. On the opposite side to the above is the steward's room, whence most of the provisions are issued, and which is the place appointed for the purser's steward to transact his business in. Sail-rooms are built between decks, upon the orlop or lower deck, to contain the spare sails. Besides these, there are several other store-rooms, in which the carpenter's, boatswain's, and gunner's stores are kept. Filling-room is a place parted off in the magazine; it is lined with sheet-lead, and therein the powder is stowed, in order to fill the cartridges.

Room and Space, the distance from the moulding edge of one timber to the moulding edge of the next timber, which is always equal to the siding of two timbers, and the room or opening between.

ROOMS, in a military sense, are those parts of a building or barrack, which, by specific instructions, the different barrack-masters must provide, and furnish for the accommodation of the king's troops in Great Britain or elsewhere. The schedule, as published by authority, describes the number of rooms allowed in barracks for the commissioned, warrant, and non-commissioned officers, and private men, to be as follows:

Cavalry Rooms.—Field-officers, each two rooms; captains, each one ditto; subalterns, staff, and quarter-masters, each one ditto; the serjeants of each troop of dragoons, and the corporals of each troop of horse, one ditto; eight rank and file, one ditto; officer's mess, two ditto.

Infantry Rooms.—Field-officers, each two ditto; captains, each one ditto; two subalterns, one ditto; staff, each one ditto; twelve non-commissioned officers, and private men, one ditto; officer's mess, two ditto; serjeant-major, and quarter-master serjeant, one ditto. When there are a sufficient number of rooms in a barrack, one may be allowed to each subaltern of infantry.

ROONAY, in *Geography*, a town of Bengal; 33 miles S.E. of Ghidore.

ROOP, a term applied to signify a hoarfencens, such as happens among animals of the cattle kind.

ROOPAPOUR, in *Geography*, a town of Hindoostan, in Oude; 31 miles E.N.E. of Manickpour.

ROOPAT, a town on the E. coast of Sumatra. N. lat. $1^{\circ} 3'$. E. long. $101^{\circ} 12'$.

ROOPGUNGE, a town of Bengal; 34 miles N.N.W. of Dinagepour.

ROOPGUR, a town of Hindoostan, in Guzerat; five miles S. of Surat.

ROOPNAGUR, a town of Hindoostan, in the country of Agimere; 30 miles E. of Agimere. N. lat. $26^{\circ} 39'$. E. long. $75^{\circ} 52'$.

ROOPOUR, a town of Hindoostan, in the circar of Sirhind; 58 miles N. of Sirhind.

ROOS, PHILIP, better known by the name of *Rosa da Tivoli*, in *Biography*, was the second son of a painter, whose name was John Hendrick Roos; and he was born at Frankfurt in 1655. His early inclination to the art practised by his father, and the proficiency he exhibited, gained him the favour of the landgrave of Hesse, at whose court the father and an uncle of Philip, called Theodore Roos, resided; and for whom they painted, conjointly, compositions of animals, landscapes, and figures.

This prince became the patron of Philip also, and presented him with a sum of money to prosecute his studies at Rome, from whence he never returned to repay the obligation. He married a beautiful woman, daughter of an historical painter, Giacinto Brandi, but was dissipated and extravagant.

He took up his residence at Tivoli, from whence comes his cognomen of *Rosa da Tivoli*, and there he imitated and combined the forms he met with. His pictures are generally made up of a group of sheep, goats, or cattle, a herdsman or woman, and a piece of building, illumined with strong contrasts of light and shade, and touched with uncommon spirit and freedom. That latter quality is their bane, for relying upon its effect upon the observers, and working generally from necessity, or the spur of the moment, he was tempted to rest satisfied with incorrectness and common-place. His shadows are generally too dark and too brown, effected by leaving the dark ground upon which he worked; but the arrangements of his lights are ingenious and capitally executed, and the colour is frequently rich and full. He died in 1705, at the age of 50.

ROOSAND, in *Geography*, a town of Norway; 48 miles N.N.E. of Romtdal.

ROOSEBURG, a small island in the Meuse; 3 miles N.E. from the Brill.

ROOT, (*RADIX*), in *Botany* and *Vegetable Physiology*, an important part of the vegetable body, being the basis of the whole, and what is first produced from the seed, when evolved by the process of germination. Its uses are, to fix the plant to a commodious situation, and to derive nourishment for its support. This organ is therefore perhaps indispensably necessary, at the first period of the growth of vegetables; and it usually continues to be so, at least amongst what are termed the more perfect kinds; the *Cuscuta*, or Dodder, being almost a solitary instance, of a phænogamous plant, parting with its root at an early age, and trusting for its future sustenance to the vegetable bodies on which it parasitically fixes. In some cryptogamous tribes the roots, though less discernible to us, are not the less effective for the performance of one or other of these functions. Thus, the crustaceous Lichens have not only a

considerable inequality of surface underneath, insinuating itself into every minute irregularity of the stone or bark over which they spread, but several of them have very distinguishable, fibrous, branched roots; witness *Lichen saxifragus*, Sm. *Transl. of Linn. Soc. v. 1. 82. t. 4. f. 4.* and *L. tartareus*. The Submersed *Alga*, or Sea-weeds, seem, at first sight, to be merely fixed by their small disk-like roots; though many of them have branched and entangled radicles, insinuating themselves among pebbles at the bottom of the sea, which last may well be organs of nourishment, as well as of support. But even such as are fixed by a mere disk, are found, if cut down to that part, to sprout up again with all the rapidity and vigour of a full-grown shrub, treated in the same manner. Hence it appears that the disk in question must act as an organ for imbibing nutriment. That process indeed seems not to be accomplished, as usual, by the base, or under part, especially considering the nature and size of the bodies to which this kind of root is commonly attached. But something analogous may be observed in several parasitical plants of the *Orchis* family, (see *ORCHIDEÆ*), whose thick fibrous roots lie naked upon the bark or branches of trees; and if they do imbibe a part of their sustenance from the latter, should seem also to be indebted considerably to the atmosphere, (to which a much larger portion of their surface is constantly exposed,) as sea-weeds are to the circumambient water. With the roots of parasitical ferns, indeed, as well as the supplementary radicles, thrown out from the climbing stem of the *Cuscuta*, the case may be different, as both are insinuated into the bark of the plants on which they grow. Floating sea-weeds, and abundance of fresh-water plants nearly related to them, agree with the *Cuscuta* so far, that after vegetating on some fixed spot, to which the parent seed attaches itself, they soon separate therefrom, and can derive nothing subsequently from thence. But being entirely disengaged, they can obtain matter of growth and nourishment, in future, from no other source, than the water in which they float. Who shall say whether such nutriment is absorbed by their whole surface; or whether the various and multiplied, fibrous or tubercular, appendages of their curious, and often complex, structure, may not, many of them, be analogous to the fibrous radicles, thrown out by the stems of the Dodder?

The most usual economy of the roots of plants is to be immersed in the earth, they having always a tendency to grow downwards, as stems in general have to ascend. Dr. Darwin's simple and luminous explanation of this phenomenon is quite sufficient, and precludes all others. He conceives that each part elongates itself in the direction in which it is most stimulated; the infant stem being most acted upon by air, the radicle by moisture.

A root commonly consists of two parts; the *caudex*, or body, and *radicula*, the fibre. The latter, generally greatly multiplied, branched, and extended, is the essential organ of nourishment.

The duration of roots is either annual, biennial, or perennial. Annual Roots, consisting chiefly of numerous fibres, belong to plants whose existence is limited to one summer, as Barley, and a vast tribe of field or garden flowers, many of which must occur to every one's recollection. Biennial Roots produce, the first season of their growth, only herbage, and, living through the ensuing winter, bear flowers and fruit, or seed, in the following summer, after which they perish; for they never blossom or fructify but once, any more than annual herbs. Their existence indeed may be prolonged by accidents which hinder their flowering, year after year, in some cases; but after perfecting seed, or
even

ROOT.

even blossoms, they die. Wheat, as cultivated with us, may be termed biennial; but is more properly an annual, which is sown and springs up the season before it flowers, as many annual weeds often do; while the seeds of others, perhaps of the same species, remain latent in the earth, awaiting the approach of spring. More genuine biennials are some species of *Verbascum*, the *Digitalis purpurea* or Fox-glove, &c. Perennial Roots belong to plants which live and blossom through many successive seasons, to an indefinite period, as is the case, not only with all trees and shrubs, but with many herbaceous plants, whose entire stems and foliage are frequently annual. Such are the bulbous roots of Tulips, Hyacinths, Anemones, &c. and the large fleshy ones of Rhubarb, and the *Gentiana lutea*, with many others, whose herbage dies every year entirely down to the ground; while other perennial roots, principally of a fibrous nature, are never deprived of herbage, as the *Gentiana acaulis*, *Lamium album*, and most perennial grasses. Several plants of hot climates, naturally perennial, and even shrubby, become annuals in our gardens, as the Common Nasturtium, *Tropeolum*, which is capable of being increased by cuttings, nearly as well as by seeds, and thus its double-flowered variety is preserved. The same thing may be said of the *Hemimeris urticifolia*. The Tree Mallow, *Lavatera arborea*, wild in Pembroke-shire, and occasionally seen in gardens, exemplifies, in a remarkable manner, the durability of the vital principle in seeds, as well as in biennial plants hindered from flowering. Nearly twenty years ago the seeds of this large and handsome shrubby plant were sown in a garden under our observation. From that period many of the young plants have, every year, sprung up, but the winter usually destroys them. A few have, now and then, survived a mild winter, and attaining a large size, have borne flowers, dying entirely at the end of autumn, nor do we believe that any of them has ripened seeds, so as to replenish the stock in the earth. At least this has not been the case for eight or nine years past. We have never taken the pains to shelter a young plant of this species in a stove, or green-house, through one or more winters; but Linnaeus, with whom it was a favoured exotic, asserts that it will sometimes wait, for several years, for a prosperous flowering season, even in the open ground, though perishing afterwards, with the first cold, in spite of all the protection it can receive.

The *Caudex*, or Body of the root, in the Turnip, assumes the appearance of a stem, by rising considerably above the surface of the ground. Such is partly the case with onions, and many exotic bulbous plants. Linnaeus speaks of the stem of a tree as a *caudex*, or root above ground. Perhaps the *caudex* may be as properly termed a subterraneous stem. This analogy nevertheless is scarcely correct, the line of demarcation being much more strictly drawn between an annual stem, and its perennial root, than between the branches of any tree and its trunk.

The fibres of the root, at least their growing extremities that imbibe nourishment from the earth, into which they are gradually and continually insinuating themselves, are, in every common case, strictly annual. The powers of roots lie dormant through our winters, or in bulbous plants, inhabitants of arid burning sands, through the summer of such climates. After they have begun to form fresh radicles, they cannot without destruction, or great danger, be transplanted; nor can even herbs with fibrous roots be safely removed, while their fibres are in a progressive state, very young annuals alone excepted.

Botanists, as well as gardeners and agriculturists, distinguish several kinds of roots, whose nature requires atten-

tion from those who wish to be masters of their economy or cultivation. The following are the principal heads under which they may be comprehended.

1. *Radix fibrosa*, a Fibrous Root, the most simple of all, consists entirely of fibres, undivided or branched, necessarily connected indeed by a common head, or by the base of the stem. These fibres convey nourishment directly to the stem or leaves. Such constitute, in general, the roots of grasses, and of most annual herbs; which latter requiring no reserved store of provision for another season, have no need of a *caudex* in which it might remain through the winter. While such roots exist, they keep growing, successively forming new fibres, as well as elongating their older ones. Their fibres are occasionally remarkably shaggy, or downy; whether to increase the surface for more ample absorption, or to fix the plant more firmly in the ground, we cannot always directly determine. Botanical experience has taught us, that very downy or woolly fibres are especially appropriated to grasses that inhabit loose blowing sand.

2. *Radix repens*, a Creeping Root, is rather perhaps a subterraneous stem, branching off horizontally, extending itself at the extremity, and decaying at its origin, throwing out fibres as it goes, which are the efficient or actual roots. Such a root is extremely tenacious of life, as any portion of it will grow. Weeds which have this sort of root, as Couch-grass and Mint, are the most difficult of all things to eradicate, except perhaps the deeply descending roots, partly fleshy, of *Convolvulus arvensis*, and *Carduus*, or rather *Cnicus arvensis*, whose more vertical position enables them to run so far into the ground as to be hardly accessible. The widely creeping roots, well guarded with hard and durable sheaths, and supported by long woolly fibres, which belong to many sea-side, or sand, grasses, render such plants of great importance in the economy of nature. They bind down the loose sand, and form barriers against the encroachments of the ocean itself. The whole country of Holland is perhaps indebted for its very existence to such natural mounds, judiciously fostered and imitated by art. The three principal grasses that serve so valuable a purpose are *Carex arenaria*, *Arundo arenaria*, and *Elymus arenarius*, all plentiful on our sandy shores.

3. *Radix fusiformis*, a Spindle-shaped, or Tap Root, like the Carrot, Parsnep, Radish, and many common plants, of biennial, perennial, or more rarely annual duration. Its form is best calculated for penetrating deeply into the ground, or rather is owing to the resistance encountered by the young descending radicle. The *caudex*, of a fleshy juicy substance, abounding with peculiar secretions, and pregnant with the materials of the future herb, throws out numerous fibres, which are the real roots.

4. *Radix præmorsa*, an Abrupt Root, is nothing more than an oblong or spindle-shaped, vertical or horizontal, fleshy root, whose progress has been impeded, either by want of vigour, or by some mechanical interruption, so that it seems to have been cut or broken off. The name alludes to an ancient opinion of its having been bitten off, by no less a personage than "the devil," out of spite to mankind. Hence several plants, with such a root, were relied on for their supposed medical virtues, which nothing but heresy and schism could doubt.

5. *Radix tuberosa*, a Tuberos or Knobbed Root, is of various kinds. This sort of root belongs to perennial plants, its knobs, whether of themselves annual, biennial, or perennial, being reservoirs of nourishment, and of vital energy, in which the resources of the herb are husbanded through the winter. Such are the Potatoe, and Jerusalem Artichoke. Many of the Vetch or Pea tribe

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have likewise small annual tubercles to their roots, by which these plants are enabled better to support the casual privations of a barren, dry soil. The knobs of *Pæonies* and *Spiræa Filipendula* are perennial, and analogous to bulbs. In the *Orchis* family they are biennial, whether simply oval, hand-shaped, or fasciculated; for in each case the plant of the season lives on that portion of its root which was formed during the preceding year, and meanwhile makes a new pair of knobs, or bulbs, to blossom in the following summer, or at least to produce herbage, whether circumstances may admit of flowers or not. There is reason to believe that certain species of this family, as the Linnæan *Ophrys spiralis*, often produce a mere tuft of leaves, without flowering at all, for many successive years, in spots which, in favourable seasons, are profusely decorated and perfumed with that charming little flower.

6. *Radix bulbosa*, a Bulbous Root, is often solid, as in the common *Crocus*, and its near relations *Ixia*, *Gladiolus*, the splendid *Tigridia*, &c. In the Onion tribe, the bulbous root consists of concentric layers, enveloping one another, as also in the more solid root of the Tulip. The Lily has a scaly bulb, exactly analogous to the last; but as the leaves of this plant are narrow, and in some measure whorled, not sheathing, like those of the Onion and Tulip, the layers of its roots, having the closest affinity to leaves, assume a similar arrangement. The strict analogy of such coated or scaly bulbs with leaf-buds, indeed one might almost say their identity, appears from the scaly axillary buds of the Orange Lily, and other species, formed on the upper part of the stem, which, falling to the ground, become actual bulbous roots, without any transformation. Similar buds in *Dentaria* become, by a slight alteration, the tuberous scaly root proper to that genus. The constitution of bulbous roots is admirably suited for plants inhabiting hot sandy countries, subject to long drought. After flowering, their withered herbage serves like wings to disperse them far and wide, till the first rains cause them to fix their sprouting radicles in the moistened soil, where they speedily put out fresh leaves and blossoms, during the favourable season; after which their life and energy are locked up again in the bulb, or perhaps multiplied in seeds, for the succeeding year. The seeds of the *Ixia* and *Gladiolus* families are no less admirably adapted to the circumstances of their sandy and windy country; such as are winged being readily wafted, and the large polished round kinds, as extensively rolled, over the open deserts which they are appointed to adorn.

7. *Radix articulata*, or *granulata*, a Jointed or Granulated Root, does not essentially differ from a scaly bulb. The Wood Sorrel, *Oxalis Acetosella*, for instance, has, as it were, a scaly bulb, pulled out into an oblong form, and connected by a thread; while the *Saxifraga granulata* has a series of subterraneous buds, like solid bulbs. *S. cernua* and *bulbifera* have axillary buds, formed on their stems, like *Dentaria*, which become granulated roots.

The object of Nature is nearly the same throughout all these seemingly different productions; to establish a reservoir, in which the vital force of the plant, as well as its material resources, are stored up; till the former is strengthened, in consequence of suspended action, and the latter are matured by rest. Such assistance is occasionally afforded to plants whose roots have naturally hardly any thing of a fleshy substance, whenever they are exposed to danger from vicissitude, or from interrupted supplies. Thus grasses with fibrous roots, accidentally stationed in a soil too dry or fluctuating, have a power of becoming bulbous. For the same reason, bulbous roots, when desired to be had in great size or perfection, should first be supplied with plentiful nourishment,

and then be checked in the too luxuriant growth of their herbage. By some treatment of this kind, exotic bulbs, which seldom afford flowers in our gardens or stoves, because of the uniformity of their languid existence, may perhaps be made to blossom more frequently than they do. Sudden and abundant supplies of heat, food, or moisture, and as sudden checks of one or the other, at the discretion of the cultivator, are likely to have this effect. In general, an interruption of the luxuriance of a root, favours its production of flowers and of seeds. The latter are seldom perfected in the more luxuriant sorts of the Mint, except by greatly restraining the growth of the roots, in a garden-pot, dry border, or otherwise. The bulbous lilies will often form seeds, if their buds are stripped off, but seldom in their ordinary state of culture.

A just attention to the nature and constitution of each different kind of root, will teach us to understand its best mode of cultivation, transplantation, &c. and will account for those general practices, founded on experience, which are too well known to require illustration here, and properly come under the notice of the agriculturist and gardener.

ROOT, in *Husbandry*, the lower part of a plant, or that which is in the ground, and by which it adheres to the earth, draws its nourishment, and transmits it to the other parts. For the method of clearing lands from the roots of trees, under-wood, &c. see *RECLAIMING Lands*.

It may be noticed, that the roots of plants are of use to them principally in two respects, namely, to give them stability in the ground, that they may not be displaced, or blown down by high winds, or other accidents; and by their spreading in the ground, for collecting, and perhaps in some measure preparing, food for the whole plant. Plants are, however, in part fed or nourished from the air, fine vapours, dews, &c.; which enter by their leaves and branches, but principally by what is absorbed and taken up by their roots: for which reason the farmer takes infinite pains to prepare the land by tillage and manure, whereby it is opened, pulverized, and not only made more easily penetrable for the roots to spread in, and collect their nourishment, but rendered more proper for being impregnated with such matters, as well as for retaining and conveying them to their fibrous roots in order to be drank up.

Roots, in the intention of the farmer, may also be divided into two sorts, namely, perpendicular or tap-roots, which penetrate deep, and run down into the ground, usually singly, such as carrots, parsneps, and the roots of some trees, as the oak, &c. And those that divide near the surface of the ground, and spread out in it in various directions, which are called horizontal and fibrous roots, and if very small, capillary roots. The tap-roots have also fibrous roots issuing from their sides, all round the tap-root; and these lateral roots are longest near the surface of the ground, and gradually shorter as the tap-roots descend deeper into the soil.

And further, the surfaces of roots are soft and spongy, more particularly in the small or fibrous roots, and these are furnished with absorbent vessels, the mouths of which drink up the vegetable food, and distribute it to all parts of the plant. As the large roots are more close and hard on their surfaces, it would appear that they are chiefly intended for the support and stability of the plant, while the fibrous roots collect the nourishment for the support of the plant as well as the large roots. The branches of roots are formed with their extreme ends pointing from the stem of the plant, and hence it appears that roots, when once well formed, do not afterwards increase, or extend further longitudinally; they lengthen at their ends, but not at their intermediate

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termediate parts, for if they did, the branches, being left behind, would be drawn back, with their ends pointing towards the stem; but they are constantly found in a contrary position, with their ends pointing in a direction from the stem. If a root is cut it extends no farther in length, as already observed, but new roots are formed near the cut end of the old root; two or more new or young roots being formed in the room of the former old one. Hence the fibrous roots of plants are multiplied by cutting them with a spade or hoe; and this is often a great benefit to the plant. The pores of the fibrous roots are the mouths of the absorbent vessels, by which the whole plant is fed, and the more they are multiplied the more nourishment they collect for it.

And thus a plant that naturally extends its roots to a considerable distance, is in danger of being killed by transplanting, unless it is also furnished with fibrous roots, which must be carried with it to the new ground; or new ones must be formed to make the plant thrive. Hence it is that plants which have long straggling roots are removed with difficulty; but plants of the same kind and age, and that grow in the same ground, are transplanted with safety and success, if they have been previously dug round with a spade, whereby their fibrous roots have been cut and multiplied, so that they rise with a ball of earth adhering to them.

Besides, there is a communication between the different roots of a plant, as when some of them are well nourished the others are benefited thereby. If some of the roots of a plant be laid in dry earth or sand, and others in water, the latter will furnish the dry roots with water sufficient to keep them and the earth about them moist, so long as they have a supply of water; it is for this reason that deep rooting plants are little affected by drought; the tap-roots finding moisture below, send some of it up to the roots near the surface; for which reason, also, lucern and saintfoin flourish in dry hot weather, in which common grass, and other fibrous-rooted plants, that do not descend deep, are scorched and burnt up. And as roots communicate moisture to each other, they therewith also communicate nourishment; for it is found by experience, that drilled plants, well hoed on each side of a row only, are better nourished than sown plants standing at equal distances, or upon an equal surface of ground with the drilled, and not hoed. Besides these sorts of roots, some kinds of grain, as that of wheat, have them double, or what may be termed two sets; the first coming directly from the grain or seed, while the latter shoots some time afterwards from the top or crown. Hence they are denominated *feminal* and *coronal* roots. The feminal root is, Dr. Hunter says, pushed out at the same time with the germ, which, together with the farina, nourishes the plant during the winter, before the crown and coronal roots are formed. But that in the spring, when the crown has become sufficiently large, it detaches a number of strong fibres, which push themselves obliquely downwards. These are the coronal roots serving to nourish the plant till it arrives at maturity. And he adds, that a small pipe preserves the communication between them and the feminal roots. This makes an essential part of the plant, and is observed to be longer or shorter, according to the depth that the seed has been buried. But on the contrary, it is remarkable, that the crown is always formed just within the surface. Its place is the same, whether the grain has been sown deep or superficial. And that as the increase of this sort of grain depends upon the vigorous absorption of the coronal roots, it is obvious why they fix themselves so near the surface, where the soil is the most rich, and contains

the largest proportion of nutritious substances. It is also evident, that as this sort of grain must be exposed to the severity of the winter season, its roots are admirably disposed to withstand its effects.

It is evident, that these facts, and those connected with the nature of the roots of different plants of the grass kind, lead to many important considerations in the practice of the farmer, and fully shew the necessity as well as utility of his being perfectly acquainted with the nature, form, and mode of growth of the roots of such plants as have been introduced into the field culture.

All those sorts of fleshy roots which run to a considerable depth in the ground, as is the case with the carrot, parsnep, beet, mangel wurzel, liquorice, and some others of the same nature, constantly require a great depth of cultivation and tillage to secure good and full crops. And the various less fleshy roots, which run deeply in the earth, such as those of beans, hops, parsley, red clover, lucern, saintfoin, and many sorts of grasses, as well as the common and Swedish turnip, &c. also stand in need of a rather fine and deep preparation of the soil in order to afford equal and full crops.

Among the grain kinds of crops, wheat, from the nature of its root, demands the deepest and finest tillage; but neither this nor any of the others require any great depth of ploughing merely on that account, as the roots always spread out very near the surface. The same is the case with most of the cabbage sorts, yet the land should always be well prepared for them.

Much difference of opinion has been entertained by different inquirers respecting the cause of the constant downward direction of roots and the upward growth of stems. Some have supposed it to depend on the quality of the sap juice which circulates within them; others have, with greater ingenuity and plausibility, asserted it to be owing to the living principle or power in them, and the stimulus of the air and moisture upon different parts of them. And more lately, and with still greater probability, it has been attributed to circumstances of a mechanical nature, as depending on the principle of gravity. This notion has been beautifully illustrated and explained by the experiments of Mr. A. Knight, by placing moistened beans in favourable situations for vegetating upon the circumferences of wheels moving with different degrees of velocity in vertical and horizontal positions.

The roots of large old trees, which have been felled, are often got out of the ground in a cheap convenient manner by blasting or blowing them with gunpowder, by means of a boring auger contrived for the purpose. See **BLASTING**.

ROOTS, in Gardening, are of many different kinds, which vary considerably in their nature. They mostly consist of a stock, or thick main part, which strikes into the earth or soil, and of fibrous or thread-like parts, which terminate, and are sent off from different portions of it, spreading themselves to great distances in the ground, for the purpose of collecting the nourishment and support of the particular plant.

The peculiarities of structure, and the direction in the stock parts of roots, have led to several distinctions in regard to their kinds.

In this way we have *perpendicular* and *horizontal* roots, or those which descend and run down into the earth or soil in a straight downward direction; and those which run or pass along under the surface of the ground in a superficial transverse manner: *simple* and *compound* or *branched* roots, or such as are perfectly single, and without any sort of subdivision in their parts, and such as are divided in a lateral

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lateral branched manner, with many subdivisions and ramifications: *spindle-shaped* and *tapering* roots, or those which have oblong thick upper parts, which taper in a regular gradual manner to the lower extremities: of this nature are the roots of the common radish, the parsnep, the carrot, and many others: *bulbous* and *tuberous* roots, or those which have a roundish, oval, swelling, bulbous form, and which are composed, in some cases, of many succulent imbricated scales, and in others, of numerous involving coats, including three distinct sorts, as scaly bulbs, having the parts lying over one another, as in the root of the lily; tunicated bulbs, which are formed of several different tunics or coats involving each other in a close manner, as in the onion; and solid bulbs, as in the tulip; and those which are of a thick, fleshy, knobby, solid, lumpy form, whether of a roundish, irregularly knobbed or oblong shape, whether constituted of only one knob, or of several collected into bundles: examples of these sorts are met with in the roots of the potatoe, the Jerusalem artichoke, anemone, pæony, &c. as well as in all those which are made up of a solid fleshy substance: *fibrous* and *creeping* roots, or such as are wholly composed of numerous radical or slender fibrous parts, and are the most common sort, especially in various descriptions of herbaceous plants, consisting of roots of the perpendicular, horizontal, simple, and branched kinds; some of which are very thin and fine, like threads, others somewhat of a fleshy nature; and such as run along immediately under the surface of the ground to a considerable length or distance, emitting and sending forth at certain points small fibres below and shoots at the upper parts: *globular* and *bundled* roots, or such as have roundish, fleshy, solid roots of the tuberous description, as in the earth-nut, &c. and such as are composed of many small, oblong, fleshy kernelly parts or knobs, which are all connected on the upper part, and terminated underneath in radicles or fibres, as in the ranunculus, &c.: these are also often termed *grumous* roots: *granulous aggregate* and *pendulous clustered* roots, or those which consist of many roundish knobs, like grains of corn, the whole of which is congregated together, so as to form a root; and those which are composed of several roundish fleshy knobs or tubers, which are strung on and suspended, as it were, at the ends of fibres, as in the asphodel and many others: *banded tuberous* and *testiculated* roots, or such as have oblong tuberous forms of them which divide and spread out like an open hand, and such as are composed of two roundish, egg-like, tuberous knobs, united in somewhat a testiculated manner: *jointed* and *woody* roots, or those which are long, thickish, and jointed at certain distances; and those which are constantly becoming of a hard, tough, woody nature, as those of most trees, shrubs, and under-shrubs: and *downright* or *tap* roots, or those which have a main fleshy part, that runs directly downwards in a perpendicular manner, as in the carrot, parsnep, beet, &c. as well as in some sorts of trees and shrubs.

Garden roots are likewise further divided and distinguished according to the time of their duration or lasting in the soil or ground. In this respect, there are *annual* roots, or those which continue or endure for one year only, at the farthest, and then wholly perish and decay, as in all the annual plant kind: *biennial* roots, or such as continue and last out for two years, or thereabouts, only, after which they entirely decay and are destroyed; and *perennial* roots, or such as are of many years' duration or continuance. In some cases of this nature both the roots and items are perennial, while in others only the former.

Roots of the garden description, for the most part, penetrate and insert themselves into the soil or ground, in order

to draw and derive nourishment and support from it; but there are some few which form exceptions to this rule, as the root of the mistletoe, which attaches and fixes itself to the branches or other parts of trees, being inserted between their bark and wood, whence it acquires its means of support, the stem proceeding in a downward direction from it, &c.

In bulbous roots of different kinds, there are great differences in regard to their habits of growth, in so far at least as relates to the depths which they require to be in the earth or soil; some standing in need of being quite superficial, while others necessarily descend to considerable depths below the surface. These circumstances therefore probably require much greater attention in their cultivation than has hitherto been bestowed upon them, in order to procure good roots of such kinds.

The roots of different kinds of garden plants require to be taken up at particular seasons, and to be kept and preserved for use in different manners, according to their different natures, and the purposes for which they are intended. All the roots of the different flower bulb and tuberous kinds may be taken up when the stalks decline towards the end of summer, or the beginning of the succeeding season; they should then be rendered perfectly dry by some gentle means, such as exposing them to a dry current of air and a middling degree of heat, when thinly spread out in a sieve, or some other convenient manner; afterwards, when this has been perfectly accomplished, they may be put into drawers in dry situations, or hung up in bags in similar places.

Bulbous culinary roots of the onion kind have been attempted to be kept in many different ways, as by laying them thinly in dry rooms, roping them and hanging them up in dry airy places, and burning or charring the root parts of the bulbs; but they seem not to be capable of being long preserved without shooting while in the open air, in any way that has hitherto been made trial of in such intention. The best methods of proceeding with them are probably those of taking them from the ground after some dry weather, exposing them thinly to the sun and air until they are become, in every respect, perfectly in a state free from any sort of mould or moisture, and then either to have them roped and hung up, or spread out in a thin manner upon a dry boarded floor. The warmth or heat of the sun or fire should never be suffered to penetrate into the places where they are kept, but they should be naturally dry.

Tuberous roots, such as those of the potatoe, in the general keeping crop, should always be taken up during a dry season, and be afterwards, as quickly as possible, by mild means, made thoroughly dry and free from any mouldy matter that may hang about them, when they may be laid up in any place which is free from damp, taking care to cover them sufficiently thickly with dry straw when the weather is frosty. Roots of the Jerusalem artichoke, and other similar kinds, may be preserved in the same way, but without the use of the straw, as they do not stand in need of it.

Perpendicular and tap-roots, such as those of the carrot, parsnep, beet, and others of the same fleshy kind, sometimes require to be laid up in order to preserve them in a juicy moist state. This is best accomplished by the use of dry light sand, or other similar materials of a light dry nature, packing them up in layers one over the other, each sort together, in a separate manner. In this way they may be well preserved in a state fit for constant use. The roots of celery and cardoons may also be preserved in the same way with much success and advantage when necessary.

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It is occasionally necessary that the tap-roots of seedling plants, while they are in the nursery, should be shortened, with the view of preventing their striking down too deep into a bad subsoil, as well as to force out lateral horizontal roots in greater abundance nearer to the surface of the ground, where the soil is good, that they may derive more full nourishment and support, and thereby thrive in a better and more expeditious manner.

The roots of annual and biennial plants stand in need of being renewed every year, or at the end of every two years, by the sowing of their seeds, or the setting of some other part of them: and the perennial roots are continued by the parting, dividing, slipping, cutting, and resetting of them or their different parts, as well as by various other methods, as may be seen fully described under their different proper heads.

Roots, in Medicine. The principal roots used in the practice of physic, are rhubarb, rhaponticum, sarsaparilla, ipecacuanha, jalap, zedoary, galangal, cassumenar, gentian, turmeric, liquorice, madder, &c. See RHUBARB, SARSAPARILLA, IPECACUANHA, &c.

There are several ways of preparing roots for medicinal use in the eastern nations, which strongly alter them from their original form and appearance. An instance we have of this in the drug called salep, which is no other than the root of an orchis thus prepared.

Other roots they also prepare in the same manner, or something like it; an instance of which we have in some of the oriental ginseng, which is clear and pellucid, as a resin, and friable like one, retaining very little of the structure or appearance of the root. Kämpfer gives the method by which the people in the East do this, and it may be well worth trying on some of our own roots.

The Chinese, this author informs us, give their ginseng its colour and transparency in this manner. They macerate the fresh root for three days in cold rice-water, then expose it in close vessels to the vapour of the same water; after which they carefully and leisurely dry it, and it becomes hard and brittle, of a brownish-red colour, and as transparent as a resin.

All the ginseng of China is not of this sort; and it has been supposed by some, that such as was so had assumed that appearance by age, as many of the more succulent roots, which have very small fibres, will become much less opaque when perfectly dry than they were at first; but experience shews that this is not the case; for many persons have kept the oriental ginseng a great many years, but it has never been known to assume that appearance. There is no doubt, however, but that if the West Indian ginseng were treated in this manner, it would equal the prepared ginseng of the East; for the roots of some of our umbelliferous plants, particularly the skirret, may be made clear and transparent in this manner, by only boiling it in common water, and afterwards drying it in the open air. Mem. Acad. Scienc. Par. 1740.

ROOTS, Flower. See FLOWER.

ROOT of Osteocolla, a word used to express a sort of soft and rotten matter, on which the osteocolla of Germany is found in sandy grounds.

The workmen seek after the osteocolla by the direction of certain lumps of a white marley matter, which they find lying on the sands; under this they always find a parcel of rotten vegetable matter, branching out from a main stem or trunk, at ten or twelve feet deep up to the surface; this rotten substance they call the root of the osteocolla; and they observe, that where the matter they seek after is not found round it at the time of their digging, they need only mark

the place, and dig again a year afterwards, and they will find it formed in a perfect manner. The osteocolla found near Frankfort is all of this kind; and we find the holes in the centre of all the pieces through which this root had passed. It is so tender, that it usually moulders away on the osteocolla being exposed to the air; but sometimes they wash it out. Phil. Trans. N^o 39.

It is not easy to conceive what this is, unless the remains of fossil branches of trees; but even then it is as difficult to account for the formation of the osteocolla about them, as there is none of it found concreted where they are not. We have a sort of osteocolla found with us in what we call petrifying springs; but as this is done in the water, it is easier to conceive how it becomes so pure, than how a soft and pappy substance, found in the midst of a bed of sand, comes not to have some sand embodied in it.

ROOT, Indian Arrow. See ARROW-root.

ROOT, China. See SMILAX.

ROOT, False China, a species of *Senecio*; which see.

ROOT, Fever, a species of *Triosteum*; which see.

ROOT, Hollow, a species of *Adoxa*; which see.

ROOT, Rose. See ROSE-root.

ROOT, Seminal. See SEMINAL.

ROOT, Snake. See SNAKE-root.

ROOT, Black, or Wild Snake, of America, a species of *Actea*; which see.

ROOT, Dr. Witt's Rattle-snake, a species of *Prenanthes*; which see.

ROOT, Senegaw Rattle-snake, a species of *Polygala*; which see.

ROOT, Sweet, a species of *Glycirrizza*; which see.

ROOT of Scarcity, in Agriculture, the common name of a plant of the tap-rooted fleshy kind, that has much resemblance to the beet, and which is now cultivated to a very large size both in the root and top, as cattle food, where a proper sort of seed is provided. It is a very hardy vegetable, is easily grown, and much relished by horses as well as neat cattle. See MANGEL Wurzel.

ROOT-Crops, such sorts of field crops as afford their produce in roots, such as potatoes, turnips, carrots, parsneps, &c. These sorts of crops constantly require to have the ground peculiarly prepared for them. See these several heads.

Some of the crops require that the land be well pulverized and prepared before they are put into it, and afterwards to have the mould well stirred and laid up about them while they are growing. They should also, in many instances, be at first, or in a gradual manner, thinned, set out, and left at suitable distances for gaining their full and perfect states of growth. Some of them stand in need of being regularly taken up out of the ground at the proper season and stored up, as the potatoe, carrot, parsnep, beet, &c. while others may often remain in the soil until they are consumed, as the various sorts of turnips, and some others, not only without sustaining any great injury, but sometimes with much benefit. The Swedish turnip is, however, frequently stored up with utility and convenience. When laid up they require to be in a dry condition on the outside, and to be deposited in dry situations. Potatoes should always be kept dry and secured from frost, by means of straw or other similar matters being laid round them.

ROOT-Grafting. See ENGRAFTING.

ROOT-House, in Rural Economy, the place where roots are deposited for the more readily supplying live-stock of different kinds with them. It is of much consequence to the farmer to have this place as near as possible to the stables, feeding-houses, and cattle-sheds. These houses are essentially necessary

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necessary wherever there is a number of cows or other sorts of cattle to be supported on roots of the carrot, parsnep, turnip, and potatoe kinds, as well as for cabbages, as without them it would not be only inconvenient, but in many cases, in severe weather, impossible to provide them for the daily supply of such stock. The cabbages should not, however, ever be kept long in these houses, as they are very apt to take on the putrid fermentation, and become useless. The farmer should be careful that the yard-man constantly keeps such places perfectly clean and sweet, in order that the roots may contract no bad smell, as cattle are in many cases extremely nice in their feeding, and when once disgusted with any sort of food of this kind, seldom take to it again in a proper manner.

Root-houses are always the best and sweetest when laid over on the insides with a coarse plaster, or boarded with some rough common boarding material. They may in many cases be divided for different sorts of roots, with great advantage and convenience. The doors of them should for the most part be large, so that the carts may be backed and readily emptied in at them without any difficulty.

Root, in *Arithmetic* and *Algebra*, denotes a quantity which, being multiplied by itself, produces some higher power, and it is called the 2d, 3d, 4th, &c. root, according to the number of times that the multiplication by itself is performed, that number being always one less than the denomination of the root: thus, if a number is multiplied once by itself, it is called the square root, or 2d root of the product; if twice, it is called the cube, or 3d root; if three times, the biquadrate, or 4th root; and so on to other roots, which, beyond the 4th, are commonly denoted by the 5th, 6th, &c. root; though ancient authors, and even some modern ones, use particular denominations for all higher roots, as we do for the square root and cube root. Thus, the

2d root,	is called the	square root.
3d root	—	cube root.
4th root	—	{ quadrato-quadratum, or biqua-
		dratic root.
5th root	—	sur-solid root.
6th root	—	quadrato-cubo.
&c.		&c.

But such distinctions are useless, and are, therefore, now commonly omitted.

For the method of extracting the roots of numbers, see the articles APPROXIMATION and EXTRACTION; and for a table of the square roots and cube roots of numbers, see the conclusion of this article.

Roots of Equations, in *Algebra*, denote such a number or quantity as, when substituted for the unknown quantity, will produce an equality between both sides of the equation: thus, in the equation

$$x^3 - 6x^2 + 11x = 6, \text{ or } x^3 - 6x^2 + 11x - 6 = 0;$$

if we substitute 1 instead of x , we have $1 - 6 + 11 = 6$; therefore 1 is a root of that equation: if we substitute 2 instead of x , we have $2^3 - 6 \cdot 2^2 + 11 \cdot 2 = 6$; therefore 2 is also a root of the same equation: and if we substitute 3 for x , then $3^3 - 6 \cdot 3^2 + 11 \cdot 3 = 6$; and, therefore, 3 is likewise a root of the same equation: hence the roots are 1, 2, and 3; that is, there are three distinct numbers, which, when substituted for x , will produce the equality required. And it is the same in all equations, *viz.* it has always as many roots, real or imaginary, as there are units in the index of the highest power of the unknown quantity. This property has place in equations of the most simple forms, as $x^2 = 1$, $x^3 = 1$, $x^4 = 1$, $x^5 = 1$, &c. each of these

having as many roots as there are units in the exponent of the power: thus, the

two square roots of 1, are $+1$ and -1 ;

three cube roots of 1, are 1 , $-\frac{1}{2} + \frac{\sqrt{3}}{2}\sqrt{-1}$, and $-\frac{1}{2} - \frac{\sqrt{3}}{2}\sqrt{-1}$;

four 4th roots of 1, are 1 , -1 , $+\sqrt{-1}$, and $-\sqrt{-1}$;

five 5th roots of 1, are 1 , $\frac{-1 + \sqrt{5}}{4} \pm \sqrt{\left\{ \left(\frac{-1 + \sqrt{5}}{4} \right)^2 - 1 \right\}}$ and $\frac{1 - \sqrt{5}}{4} \pm \sqrt{\left\{ \left(\frac{-1 - \sqrt{5}}{4} \right)^2 - 1 \right\}}$

the two latter forms containing each two roots, in consequence of the ambiguous sign, \pm , which enters into their composition.

The doctrine of the roots of equations is one of the most intricate, but at the same time most interesting, of any branch of algebra. The method of finding the roots of quadratic equations is found in the earliest algebraic authors; it is even given, though somewhat different in form, in the *Bija Ganita*, a Sanscrit algebra, written about the latter end of the 12th, or the beginning of the 13th century, translated into Persian in 1634, and lately into English by Mr. Strachey, of the East India Company's Bengal civil establishment. The solution of cubic equations was first published by Cardan about 1540, though it is clear that he was not the inventor of the method, having received it from Tartaglia, who is commonly considered as the real author; however, Lagrange attributes the general investigation to Hudde, a celebrated Dutch mathematician, a contemporary of Descartes and Fermat. Equations of the 4th degree were first solved by Ferrari, a pupil of Cardan's, and published by the latter in 1540; since which time no further extent has been given to the subject, the 5th, and all higher equations having resisted the whole accumulated power of the modern analysis. Still, however, many important properties of the roots of equations have been discovered; the whole theory has been reduced to one uniform principle of operation; and approximations have been made in all those cases where direct methods of solution were unattainable. We cannot, of course, enter upon this subject at any great length; but a summary of the most interesting particulars, though not accompanied, in all cases, with their demonstration, will not, we presume, be unacceptable to the general reader; in the enumeration of which we shall avail ourselves of the Introduction to Barlow's Mathematical Tables.

General Properties of the Roots of Equations.

1. Every equation of the general form

$$x^m + Ax^{m-1} + Bx^{m-2} + Cx^{m-3} + \&c. + K = 0$$

has m roots real or imaginary (see *IMAGINARY ROOTS*); and may be supposed to be formed by the continued product of m factors,

$$(x - \alpha) (x - \beta) (x - \gamma) (x - \delta) \&c. = 0,$$

where $\alpha, \beta, \gamma, \delta, \&c.$ are the roots of the equation.

2. The imaginary roots of an equation always enter in pairs, and if $a + b\sqrt{-1}$ be one of those roots, $a - b\sqrt{-1}$ is another of them; so that the sum of every pair of them is a real quantity, and the square of their difference a real negative quantity; and an equation can have no imaginary root but is reducible to the above form. These properties of the imaginary roots of equation are generally attributed to d'Alembert.

ROOT.

3. Since every equation

$$x^m + Ax^{m-1} + Bx^{m-2} + Cx^{m-3} + \&c. + K = 0$$

is composed of the factors

$$(x - \alpha) (x - \beta) (x - \gamma) (x - \delta) \&c. = 0,$$

it is obvious, that if, by any means, one of those roots, as α , can be found, the original equation may be divided by $(x - \alpha)$, and thence be reduced to another of lower dimensions.

4. If we suppose the signs of each of the roots of an equation to be changed, then the co-efficient of the second term of that equation will be equal to the sum of all those roots so changed; the co-efficient of the third term equal to the sum of all the products that can be formed with them, taken two and two at a time; the co-efficient of the fourth term equal to all the products that can be formed with them, taken three and three at a time; and so on to the absolute term, which is equal to the product of all the roots; thus, if a, b, c, d , be the roots of an equation, then the co-efficient of the first term being 1, that of the

$$\begin{aligned} 2d &= -(a + b + c + d) \\ 3d &= (ab + ac + ad + bc + bd + cd) \\ 4th &= -(abc + abd + acd + bcd) \\ 5th &= abcd \end{aligned}$$

5. If the substitution of any two numbers, m and n , instead of the unknown quantity of an equation, give results with contrary signs, one, or some odd number, of the real roots of the equation, are contained between those two limits.

6. And conversely, if two numbers be substituted for the unknown quantity of an equation, which comprise between them any odd number of the roots of that equation, the results thus obtained must necessarily have contrary signs. But if two, or any even number of roots, be comprised between those limits, then no change of signs will take place in the results. See a demonstration of these properties in Barlow's Tables.

7. Therefore, when we substitute for the unknown quantity of an equation the several terms of the progression, 0, 1, 2, 3, &c. it will furnish us with the integral limits of all the real positive roots of that equation, provided it has not any that differ from each other by a quantity less than unity, or if it have any odd number of such roots; but if two, or any even number of its roots, be comprised between two consecutive integers, then these substitutions will not enable us (at least not by the change of sign) to discover the integral limits between which they are comprised.

8. But if we substitute for the unknown quantity the several terms of the progression, 0, Δ , 2 Δ , 3 Δ , &c. Δ being supposed less than the difference of any two of the real roots of the equation, then the limits of every real positive root will be indicated by the several changes of signs in the respective results.

The above two properties have chiefly reference to Lagrange's method of approximation.

9. If, in an equation, whatever real value be substituted for the unknown quantity, the result is always positive, it is certain that all the roots of that equation are imaginary.

10. The signs of all the roots of an equation may be changed from positive to negative, or from negative to positive, by changing the signs of the alternate co-efficients, viz. the 2d, 4th, 6th, &c.; and hence the finding the real roots of an equation is reduced to that of finding positive roots only.

11. Every equation of an odd degree has at least one real root, which will be positive if the last term be negative, or negative if that term be positive.

12. Every equation of even dimensions, having its last term negative, has at least two real roots, one positive and the other negative; but if its last term be positive, it furnishes us with no means of judging of the nature of the roots.

13. The first term of an equation having (as we have supposed throughout) unity for its co-efficient, its greatest positive root will be less than the greatest negative co-efficient plus 1.

14. And the absolute term of an equation being divided by the sum of that term, and the greatest co-efficient having a contrary sign, will give a limit less than the least root of that equation.

15. An equation, having unity for the co-efficient of its first term, and integral co-efficients for all its others, cannot have a fractional root, viz. its roots must be either integral, irrational, or imaginary.

16. An equation cannot have more real positive roots, than there are variations in the succession of the signs of its co-efficients, nor more real negative roots than there are permanencies of signs.

Therefore, when all the roots of an equation are real, there are precisely as many positive roots as there are variations, and as many negative roots as there are permanencies.

17. When any term of an equation is wanting, or has its co-efficient equal to zero, and the preceding and following terms have the same signs, the equation has necessarily some imaginary roots.

18. An equation cannot have all its roots comprised between two consecutive integers, nor between any two integers, of which the difference is not greater than 2.

These properties, the demonstrations of which are given by different algebraical authors, may frequently be advantageously consulted in determining the nature and limits of the roots of equations.

On the Forms of the Roots of Equations.—We have before observed, that the roots of equations, beyond those of the fourth degree, cannot be generally exhibited in an analytical form; yet from the analogy discoverable in those of inferior dimensions, there seems little doubt but that those of the fifth and higher dimensions partake of the same form.

When an equation of the second, third, or fourth degree has its second term taken away, to reduce it to its most convenient form for solution, the roots will have the following form.

Second Degree.

$$x = a \sqrt{p}, \quad x = a' \sqrt{p}, \quad \text{where } a, a', \text{ are the roots of } 1.$$

Third Degree.

$$x = \sqrt[3]{p^3 + \sqrt[3]{q}}, \quad x = a' \sqrt[3]{p} + a^2 \sqrt[3]{q}, \quad x = a^2 \sqrt[3]{p} + a \sqrt[3]{q},$$

where a and a' are the two imaginary roots of $\sqrt[3]{1}$.

Fourth Degree.

$$\left. \begin{aligned} x &= \sqrt[4]{p} + \sqrt[4]{q} + \sqrt[4]{r} \\ x &= a \sqrt[4]{p} + a^2 \sqrt[4]{q} + a^3 \sqrt[4]{r} \\ x &= a^2 \sqrt[4]{p} + a^3 \sqrt[4]{q} + a \sqrt[4]{r} \\ x &= a^3 \sqrt[4]{p} + a \sqrt[4]{q} + a^2 \sqrt[4]{r} \end{aligned} \right\} \text{where } a, a^2, a^3, \text{ are the three imaginary roots of } \sqrt[4]{1}.$$

Whence

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Whence it is very natural to infer, that in an equation of the fifth degree, the roots will have the form,

$$\begin{aligned} x &= \sqrt[5]{p} + \sqrt[5]{q} + \sqrt[5]{r} + \sqrt[5]{s} \\ x &= a \sqrt[5]{p} + a^2 \sqrt[5]{q} + a^4 \sqrt[5]{r} + a^3 \sqrt[5]{s} \\ x &= a^2 \sqrt[5]{p} + a^4 \sqrt[5]{q} + a^3 \sqrt[5]{r} + a \sqrt[5]{s} \\ x &= a^3 \sqrt[5]{p} + a \sqrt[5]{q} + a \sqrt[5]{r} + a^2 \sqrt[5]{s} \\ x &= a^4 \sqrt[5]{p} + a \sqrt[5]{q} + a^2 \sqrt[5]{r} + a^3 \sqrt[5]{s} \end{aligned}$$

where a, a^2, a^4, a^3 , are the four imaginary roots of $\sqrt[5]{1}$. This generalization of the forms of the roots of equations, though generally attributed to Euler, is, we believe, due to Waring; but neither of these able analysts were able to derive from it the solution of any general equation above the fourth degree. On the subject of equations, *viz.* of finding their roots, we would refer the reader to Waring's "Meditationes Algebraicae," Lea's "Resolution of the higher Equations in Algebra," La Grange's treatise on the resolution "Des Equations Numeriques," and the Introduction to Barlow's "Mathematical Tables," from which we have extracted the following general synopsis of resolution. See also Bonnycastle's Algebra.

General Synopsis of the direct and approximate Methods of ascertaining the Roots of Numbers and Equations.

Extraction of the Roots of Numbers.

- I. Let n represent the index of the root,
- x the number of which the root is required,
- r an approximate value of $\sqrt[n]{x}$;

which may be found by trial, or otherwise, as near as convenient, and either in excess or defect: then will,

$$1. \sqrt[n]{x} = r + \frac{2r(x - r^n)}{(n+1)r^n + (n-1)x} \text{ very nearly.}$$

And using this new approximate value in the same way, another value may be found still nearer; and so on, to any degree of accuracy required.

This general formula resolves itself into the following particular ones; *viz.*

2. $\sqrt{x} = r + \frac{2r(x - r^2)}{3r^2 + x}$
 3. $\sqrt[3]{x} = r + \frac{r(x - r^3)}{2r^3 + x}$
 4. $\sqrt[4]{x} = r + \frac{2r(x - r^4)}{5r^4 + 3x}$
 5. $\sqrt[5]{x} = r + \frac{r(x - r^5)}{3r^5 + 2x}$
 6. $\sqrt[6]{x} = r + \frac{2r(x - r^6)}{7r^6 + 5x}$
 7. $\sqrt[7]{x} = r + \frac{r(x - r^7)}{4r^7 + 3x}$
- &c. &c.

By the Binomial Theorem.

II. Let $(a + b)$ represent any binomial, and n the index of the root or power, which may be either positive or negative, integral or fractional; then will

$$(a + b)^n =$$

$$(1) a^n + \frac{n}{1} a^{n-1} b + \frac{n(n-1)}{1 \cdot 2} a^{n-2} b^2 + \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} a^{n-3} b^3 + \&c.$$

If b be negative, the odd powers of b will also be negative; that is,

$$(2) (a - b)^n = a^n - \frac{n}{1} a^{n-1} b + \frac{n(n-1)}{1 \cdot 2} a^{n-2} b^2 - \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} a^{n-3} b^3 + \&c.$$

Otherwise: let $\frac{m}{n}$ represent the index, and put $\frac{b}{a} =$

Q ; also, let $A, B, C, D, \&c.$ represent the first, second, third, &c. terms of the series, with their proper signs; then will

$$(a + b)^{\frac{m}{n}} = (a + aQ)^{\frac{m}{n}} = A \frac{m}{n} + \frac{m}{n} A Q + \frac{m-n}{2n} B Q + \frac{m-2n}{3n} C Q + \frac{m-3n}{4n} D Q + \&c.;$$

which is by far the most convenient form in the case of fractional or negative indices.

ROOTS OF EQUATIONS.

QUADRATIC EQUATIONS.

III. Let $x^2 + ax - b = 0$, or $x^2 + ax = b$, represent any quadratic equation, a and b being either positive or negative; then will

$$x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}.$$

But if a and b , independent of the sign by which they are preceded, be always supposed positive; then this general formula resolves itself into the four following particular ones, *viz.*

1. $x^2 + ax - b = 0$, where $x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}$.
2. $x^2 - ax - b = 0$, where $x = \frac{a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}$.
3. $x^2 - ax + b = 0$, where $x = \frac{a}{2} \pm \sqrt{\left(\frac{a^2}{4} - b\right)}$.
4. $x^2 + ax + b = 0$, where $x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} - b\right)}$.

By Sines and Tangents.

IV.

$$1. x^2 + px = q.$$

Put $\frac{2}{p} \sqrt{q} = \tan. z$; then

$$x = \begin{cases} + \sqrt{q} \times \tan. \frac{1}{2} z, \text{ or} \\ - \sqrt{q} \times \cot. \frac{1}{2} z. \end{cases}$$

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2. $x^2 + px = q.$

Put $\frac{2}{p} \sqrt{q} = \tan. z$; then
 $x = \begin{cases} + \sqrt{q} \times \text{cof. } z, \text{ or} \\ - \sqrt{q} \times \tan. z. \end{cases}$

3. $x^2 + px = -q.$

Put $\frac{2}{p} \sqrt{q} = \sin. z$; then
 $x = \begin{cases} - \sqrt{q} \times \tan. \frac{1}{2} z, \text{ or} \\ - \sqrt{q} \times \text{cof. } \frac{1}{2} z. \end{cases}$

4. $x^2 - px = -q.$

Put $\frac{2}{p} \sqrt{q} = \sin. z$; then
 $x = \begin{cases} + \sqrt{q} \times \tan. \frac{1}{2} z, \text{ or} \\ + \sqrt{q} \times \text{cof. } \frac{1}{2} z. \end{cases}$

CUBIC EQUATIONS.

By Cardan's Rule.

V. Let $x^3 + ax - b = 0$, or $x^3 + ax = b$, represent any cubic equation wanting its second term, and in which a and b may be either positive or negative; then will

$$1. x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}} + \sqrt[3]{\left\{\frac{b}{2} - \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}}.$$

$$2. x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}} - \frac{\frac{1}{3}a}{\sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}}}.$$

Which latter form is frequently the most convenient, as it requires only one extraction of the cube root, whereas the former requires two.

The second term of a cubic equation may be taken away by the following formulæ:

Let $y^3 + py^2 + qy + r = 0.$

Assume $y = \frac{x-p}{3}$; $a = 9q - 3p^2$; and $b = 9pq - 2p^3 - 27r$;

so shall $x^3 + ax - b = 0$ be the transformed equation required, which will, under this form, have integral coefficients.

When a is negative, that is, when the equation is $x^3 - ax = b$, the preceding formula becomes

$$3. x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} - \frac{a^3}{27}\right)}\right\}} + \sqrt[3]{\left\{\frac{b}{2} - \sqrt{\left(\frac{b^2}{4} - \frac{a^3}{27}\right)}\right\}}.$$

And here, when $\frac{a^3}{27} > \frac{b^2}{4}$, both branches of the root become imaginary, and the equation is said to be of the irreducible case; no solution being then obtainable by this rule, except in those cases in which the cube root of each of

these branches can be found in other binomial surds, which, when possible, is done by the following formulæ:

$$(1) \sqrt[3]{(a \pm \sqrt{b})} = x + \sqrt{y}.$$

$$(2) x^3 - \frac{2}{3}x \sqrt[3]{(a^2 - b)} - \frac{1}{3}a = 0.$$

$$(3) y = x^2 - \sqrt[3]{(a^2 - b)}.$$

By Sines and Tangents.

VI. In this case, it is necessary to separate the above general formula into the following particular ones, according as a and b are positive or negative, as follows; viz.

Form 1. $x^3 + ax - b = 0.$
 2. $x^3 + ax + b = 0.$
 3. $x^3 - ax - b = 0.$
 4. $x^3 - ax + b = 0.$

1. *Solution of Form 1:* $x^3 + ax - b = 0.$

Put $\frac{b}{2} \left(\frac{3}{a}\right)^{\frac{2}{3}} = \tan. z$; and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2}z)} = \tan. u.$

Then $x = 2 \sqrt{\frac{a}{3}} \times \cot. 2u.$

2. *Solution of Form 2:* $x^3 + ax + b = 0.$

Put $\frac{b}{2} \left(\frac{3}{a}\right)^{\frac{2}{3}} = \tan. z$; and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2}z)} = \tan. u.$

Then will $x = -2 \sqrt{\frac{a}{3}} \times \cot. 2u.$

3. *Solution of Form 3:* $x^3 - ax - b = 0.$

This form resolves itself into two cases, according as $\frac{2}{b} \left(\frac{a}{3}\right)^{\frac{2}{3}}$ is less or greater than 1.

In the first case, put $\frac{2}{b} \left(\frac{a}{3}\right)^{\frac{2}{3}} = \text{cof. } z$, and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2}z)} = \tan. u.$

Then will $x = 2 \sqrt{\frac{a}{3}} \times \text{cosec. } 2u.$

In the second case, put $\frac{2}{b} \left(\frac{3}{a}\right)^{\frac{2}{3}} = \text{cof. } z$, then has x the three following values, viz.

$$1. x = 2 \sqrt{\frac{a}{3}} \times \text{cof. } \frac{z}{3}.$$

$$2. x = -2 \sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ + \frac{z}{3}\right).$$

$$3. x = -2 \sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ - \frac{z}{3}\right).$$

4. *Solution of Form 4:* $x^3 - ax + b = 0.$

This has also two cases, according as $\frac{2}{b} \left(\frac{a}{3}\right)^{\frac{2}{3}}$ is less or greater than 1.

In the first case, put $\frac{2}{b} \left(\frac{a}{3}\right)^{\frac{2}{3}} = \text{cof. } z$, and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2}z)} = \tan. u.$

Then will $x = -2 \sqrt{\frac{a}{3}} \times \text{cof. } 2u.$

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In the second case, put $\frac{b}{2} \left(\frac{3}{a}\right)^{\frac{1}{3}} = \text{cof. } x$, then has x the three following values:

1. $x = -2 \sqrt{\frac{a}{3}} \times \text{cof. } \frac{x}{3}$.
2. $x = 2 \sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ + \frac{x}{3}\right)$.
3. $x = 2 \sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ - \frac{x}{3}\right)$.

The two latter cases of forms 3 and 4 belong to the irreducible case, each of which gives three real roots or values of x ; whereas the other forms have each only one real root. See *IRREDUCIBLE Case*.

By infinite Series.

Let $x^3 + ax = b$ represent any cubic equation, in which a and b may be each either positive or negative.

Assume $\frac{2b}{\sqrt[3]{2(27b^2 + 4a^3)}} = \zeta$, and $\frac{27b^2}{27b^2 + 4a^3} = \pi$; then,

$$1. \begin{cases} x = \zeta \times \left[1 + \frac{2.5}{6.9} \pi + \frac{2.5 \cdot 8 \cdot 11}{6.9 \cdot 12 \cdot 15} \pi^2 + \frac{2.5 \dots 17}{6.9 \dots 21} \pi^3 + \&c.\right], \text{ or} \\ x = \zeta \times \left[1 + \frac{2.5}{6.9} \pi A + \frac{8 \cdot 11}{12 \cdot 15} \pi B + \frac{14 \cdot 17}{18 \cdot 21} \pi C + \&c.\right] \end{cases}$$

In which last form, $A, B, C, \&c.$ represent the preceding terms.

Again, assume $2 \sqrt{\frac{3}{2}} \frac{b}{a} = \zeta$, and $\frac{27b^2 + 4a^3}{27b^2} = \pi$; then,

$$2. \begin{cases} x = \zeta \times \left[1 - \frac{2}{3 \cdot 6} \pi - \frac{2 \cdot 5 \cdot 8}{3 \cdot 6 \cdot 9 \cdot 12} \pi^2 - \frac{2 \cdot 5 \dots 14}{3 \cdot 6 \dots 18} \pi^3 - \&c.\right], \text{ or} \\ x = \zeta \times \left[1 - \frac{2}{3 \cdot 6} \pi A - \frac{5 \cdot 8}{9 \cdot 12} \pi B - \frac{11 \cdot 14}{15 \cdot 18} \pi C - \&c.\right] \end{cases}$$

In which, also, $A, B, C, \&c.$ are the preceding terms.

Both these series are correct analytical expressions for the value of x , in the general cubic equation $x^3 + ax = b$; but they are not equally commodious for the purposes of solution.

The former must be used in all cases when a is positive, as also when a is negative, and $4a^3$ greater than $54b^2$; and the latter when a is negative, and $4a^3$ less than $54b^2$; because then π , in both cases, will be less than unity, and the series will, therefore, be converging ones.

BIQUADRATIC EQUATIONS.

By Simpson's Rule.

VIII. Let $x^4 + ax^3 + bx^2 + cx + d = 0$, be any equation of the fourth degree, in which a, b, c, d , may be any numbers at pleasure, positive, negative, or zero.

Find the values of p, q , and r , by means of the three equations

$$\begin{aligned} 8p^3 - 4bp^2 + (2ac - 8d)p - a^2d + 4bd - c^2 &= 0 \\ q &= \sqrt{\left(\frac{1}{3}a^2 + 2p - b\right)} \\ r &= \frac{ap - c}{2q}; \end{aligned}$$

then will the four roots of the proposed equation be contained in the following formulæ;

$$\begin{aligned} x &= -\frac{\frac{1}{2}a - q}{2} \pm \sqrt{\left\{\left(\frac{\frac{1}{2}a - q}{2}\right)^2 + r - p\right\}} \\ x &= -\frac{\frac{1}{2}a + q}{2} \pm \sqrt{\left\{\left(\frac{\frac{1}{2}a + q}{2}\right)^2 - r - p\right\}} \end{aligned}$$

The above rule was only generalized by Simpson, it is originally due to Ferrari, though commonly ascribed to Bombelli.

By Descartes' Rule.

IX. Let $x^4 + ax^2 + bx + c = 0$, be any biquadratic equation, wanting its second term.

Find the value of y in the double cubic equation

$$y^6 + 2ay^4 + (a^2 - 4c)y^2 - b^2 = 0;$$

then will the four values of x be comprised in the formulæ

$$\begin{aligned} x &= \frac{1}{2}y \pm \sqrt{\left(-\frac{1}{4}y^2 - \frac{1}{2}a - \frac{b}{2y}\right)} \\ x &= \frac{1}{2}y \pm \sqrt{\left(-\frac{1}{4}y^2 - \frac{1}{2}a + \frac{b}{2y}\right)} \end{aligned}$$

By Euler's Rule.

X. Let $x^4 - ax^2 - bx - c = 0$, be any biquadratic equation, wanting its second term, a, b , and c , being any numbers, positive, negative, or zero.

$$\text{Assume } f = \frac{1}{2}a; \quad b = \frac{b^2}{64}; \quad g = \frac{1}{16}a^2 + \frac{1}{4}c$$

Then find the three roots of the cubic equation

$$y^3 + fy^2 + gy - b = 0,$$

which let be p, q , and r .

Then will the four values of x in the original equation be expressed as follows.

When b is positive,

$$\begin{aligned} 1\text{st root } x &= \sqrt{p} + \sqrt{q} + \sqrt{r} \\ 2\text{d } x &= \sqrt{p} - \sqrt{q} + \sqrt{r} \\ 3\text{d } x &= -\sqrt{p} + \sqrt{q} - \sqrt{r} \\ 4\text{th } x &= -\sqrt{p} - \sqrt{q} + \sqrt{r} \end{aligned}$$

When b is negative,

$$\begin{aligned} 1\text{st root } x &= \sqrt{p} + \sqrt{q} - \sqrt{r} \\ 2\text{d } x &= \sqrt{p} - \sqrt{q} + \sqrt{r} \\ 3\text{d } x &= -\sqrt{p} + \sqrt{q} + \sqrt{r} \\ 4\text{th } x &= -\sqrt{p} - \sqrt{q} - \sqrt{r} \end{aligned}$$

EQUATIONS IN GENERAL.

By Approximation.—First Method.

XI. Let $x^n + ax^{n-1} + bx^{n-2} + cx^{n-3} + dx^{n-4} + \&c. = 0$, be any general equation, in which $a, b, c, d, \&c.$ are any numbers, positive, negative, or zero; then r being an approximate value of x , we have

$$1. \quad x =$$

ROOT.

$$1. x = \frac{(n-1)r^n + (n-2)ar^{n-1} + (n-3)br^{n-2} + (n-4)cr^{n-3} + \&c}{nr^{n-1} + (n-1)ar^{n-2} + (n-2)br^{n-3} + (n-3)cr^{n-4} + \&c.}$$

nearly, which general form resolves itself into the following particular ones; viz.

Equations of the third Degree.

$$2. x^3 + ax^2 + bx + c = 0;$$

$$x = \frac{2r^3 + ar^2 - c}{3r^2 + 2ar + b}.$$

Equations of the fourth Degree.

$$3. x^4 + ax^3 + bx^2 + cx + d = 0;$$

$$x = \frac{3r^4 + 2ar^3 + br^2 - d}{4r^3 + 3ar^2 + 2br + c}.$$

Equations of the fifth Degree.

$$4. x^5 + ax^4 + bx^3 + cx^2 + dx + e = 0;$$

$$5. x = \frac{4r^5 + 3ar^4 + 2br^3 + cr^2 - e}{5r^4 + 4ar^3 + 3br^2 + 2cr + d}$$

&c. &c.

By the second Method.

XII. Let $x^n + ax^{n-1} + bx^{n-2} + cx^{n-3} + dx^{n-4} + \&c. = w$, be any general equation, as before, and r an approximate value of x ; then making

$$r^n + ar^{n-1} + br^{n-2} + cr^{n-3} + dr^{n-4} + \&c. = v$$

we shall have

$$1. x = r + \frac{(w-v)2r}{(n-1)w + (n+1)r^n + (n-1)ar^{n-1} + (n-3)br^{n-2} + \&c.}$$

Or,

$$2. x = r + \frac{(w-v)2r}{(n-1)v + (n+1)r^n + (n-1)ar^{n-1} + (n-3)br^{n-2} + \&c.}$$

The first formula being applicable to the case in which r is greater than unity, and the second to those in which it is less.

These general formulæ resolve themselves into the following particular ones; viz.

Equations of the third Degree.

$$3. x^3 + ax^2 + bx = w;$$

$$x = r + \frac{(w-v)r}{w \text{ or } v + 2r^2 + ar^2}.$$

Equations of the fourth Degree.

$$4. x^4 + ax^3 + bx^2 + cx = w;$$

$$x = r + \frac{(w-v)2r}{3w \text{ or } 3v + 5r^4 + 3ar^3 + br^2 - cr^2}.$$

Equations of the fifth Degree.

$$5. x^5 + ax^4 + bx^3 + cx^2 + dx = w;$$

$$x = r + \frac{(w-v)r}{2w \text{ or } 2v + 3r^5 + 2ar^4 + br^3 - dr^2}.$$

The latter formulæ, which are by far the most converging, were first published by Mr. Barlow, in No. 12. of *Leybourn's Mathematical Repository*; with reference to which we propose giving one example by way of illustration.

Example.—Given $x^3 - 2x = 5$.

Assume $r = 2$, then (by formula 1),

$r^3 = 8$	$2r^3 = 16$
$-2r = -4$	$w = 5$
$v = 4$	
$w = 5$	
$w - v = 1$	
$r = 2$	

21 divisor.

whence $\frac{1 \times 2}{21} = .094$.

Therefore $x = 2.094$ nearly.

Assume, therefore, $r = 2.094$, then,

$r^3 = 9.181846584$	$2r^3 = 18.363693168$
$-2r = 4.188$	$w = 5$
$v = 4.993846584$	
$w = 5$	
$w - v = .006153416$	
$r = 2.094$	
$r(w - v) = .012885253$	
whence $\frac{.012885253}{23.3636931}$	$= .0005515$.

Therefore $x = .0945515$ nearly; which is true to the nearest figure in the eighth place, by only two substitutions.

ROOT.

TABLE of Square Roots and Cube Roots, from 1 to 1200.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
1	1.000000	1.000000	51	7.1414284	3.7084298	101	10.0498756	4.6570095
2	1.4142136	1.2599210	52	7.2111026	3.7325111	102	10.0995049	4.6723287
3	1.7320508	1.4422496	53	7.2801099	3.7562858	103	10.1488916	4.6875482
4	2.0000000	1.5874011	54	7.3484692	3.7797631	104	10.1980390	4.7026694
5	2.2360680	1.7099759	55	7.4161985	3.8029525	105	10.2469508	4.7176940
6	2.4494897	1.8171206	56	7.4833148	3.8258624	106	10.2956301	4.7326235
7	2.6457513	1.9129312	57	7.5498344	3.8485011	107	10.3440804	4.7474594
8	2.8284271	2.0000000	58	7.6157731	3.8708766	108	10.3923048	4.7622032
9	3.0000000	2.0800837	59	7.6811457	3.8929965	109	10.4403065	4.7768562
10	3.1622777	2.1544347	60	7.7459667	3.9148676	110	10.4880885	4.7914199
11	3.3166248	2.2239801	61	7.8102497	3.9364972	111	10.5356538	4.8058955
12	3.4641016	2.2894286	62	7.8740079	3.9578915	112	10.5830052	4.8202845
13	3.6055513	2.3513347	63	7.9372539	3.9790571	113	10.6301458	4.8345881
14	3.7416574	2.4101422	64	8.0000000	4.0000000	114	10.6770783	4.8488076
15	3.8729833	2.4662121	65	8.0622577	4.0207256	115	10.7238053	4.8629442
16	4.0000000	2.5198421	66	8.1240384	4.0412401	116	10.7703296	4.8769990
17	4.1231056	2.5712816	67	8.1853528	4.0615480	117	10.8166538	4.8909732
18	4.2426407	2.6207414	68	8.2462113	4.0816551	118	10.8627805	4.9048681
19	4.3588989	2.6684016	69	8.3066239	4.1015661	119	10.9087121	4.9196847
20	4.4721360	2.7144177	70	8.3666003	4.1212853	120	10.9544512	4.9324242
21	4.5825757	2.7589243	71	8.4261498	4.1408178	121	11.0000000	4.9460874
22	4.6904158	2.8020393	72	8.4852814	4.1601676	122	11.0453610	4.9596757
23	4.7958315	2.8438670	73	8.5440037	4.1793390	123	11.0905365	4.9731898
24	4.8989795	2.8844991	74	8.6023253	4.1983364	124	11.1355287	4.9866310
25	5.0000000	2.9240177	75	8.6602540	4.2171633	125	11.1803399	5.0000000
26	5.0990195	2.9624960	76	8.7177979	4.2358236	126	11.2249722	5.0132979
27	5.1961524	3.0000000	77	8.7749044	4.2543210	127	11.2694277	5.0265257
28	5.2915026	3.0365889	78	8.8317609	4.2726586	128	11.3137085	5.0396842
29	5.3851648	3.0723168	79	8.8881944	4.2908404	129	11.3578167	5.0527743
30	5.4772256	3.1072325	80	8.9442719	4.3088695	130	11.4017543	5.0657970
31	5.5677644	3.1413806	81	9.0000000	4.3267487	131	11.4455231	5.0787531
32	5.6568542	3.1748021	82	9.0553851	4.3444815	132	11.4891253	5.0916434
33	5.7445626	3.2075343	83	9.1104336	4.3620707	133	11.5325626	5.1044687
34	5.8309519	3.2396118	84	9.1651514	4.3795191	134	11.5758369	5.1172299
35	5.9160798	3.2710663	85	9.2195445	4.3968296	135	11.6189500	5.1299278
36	6.0000000	3.3019272	86	9.2736185	4.4140049	136	11.6619038	5.1425632
37	6.0827625	3.3322218	87	9.3273791	4.4310476	137	11.7046999	5.1551367
38	6.1644140	3.3619754	88	9.3808315	4.4479602	138	11.7473444	5.1676493
39	6.2449980	3.3912114	89	9.4339811	4.4647451	139	11.7898261	5.1801015
40	6.3245553	3.4199519	90	9.4868330	4.4814047	140	11.8321596	5.1924941
41	6.4031242	3.4482172	91	9.5393920	4.4979414	141	11.8743421	5.2048279
42	6.4807407	3.4760266	92	9.5916630	4.5143574	142	11.9163753	5.2171034
43	6.5574385	3.5033981	93	9.6436508	4.5306549	143	11.9582607	5.2293215
44	6.6332496	3.5303483	94	9.6953597	4.5468359	144	12.0000000	5.2414828
45	6.7082039	3.5568933	95	9.7467943	4.5629026	145	12.0415946	5.2535879
46	6.7823300	3.5830479	96	9.7979590	4.5788570	146	12.0830460	5.2656374
47	6.8556546	3.6088261	97	9.8488578	4.5947009	147	12.1243557	5.2776321
48	6.9282032	3.6342411	98	9.8994949	4.6104363	148	12.1655251	5.2895725
49	7.0000000	3.6593057	99	9.9498744	4.6260650	149	12.2065556	5.3014592
50	7.0710678	3.6840314	100	10.0000000	4.6415888	150	12.2474487	5.3132928

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
151	12.2882057	5.3250740	201	14.1774469	5.8577660	251	15.8429795	6.3079935
152	12.3288280	5.3368033	202	14.2126704	5.8674643	252	15.8745079	6.3163596
153	12.3693169	5.3484812	203	14.2478068	5.8771307	253	15.9059737	6.3247035
154	12.4096736	5.3601084	204	14.2828569	5.8867653	254	15.9373775	6.3330256
155	12.4498996	5.3716854	205	14.3178211	5.8963685	255	15.9687194	6.3413257
156	12.4899960	5.3832126	206	14.3527001	5.9059406	256	16.0000000	6.3496042
157	12.5299641	5.3946907	207	14.3874946	5.9154817	257	16.0312195	6.3578611
158	12.5698051	5.4061202	208	14.4222051	5.9249921	258	16.0623784	6.3660968
159	12.6095202	5.4175015	209	14.4568323	5.9344721	259	16.0934769	6.3743111
160	12.6491106	5.4288352	210	14.4913707	5.9439220	260	16.1245155	6.3825043
161	12.6885775	5.4401218	211	14.5258390	5.9533418	261	16.1554944	6.3906765
162	12.7279221	5.4513618	212	14.5602198	5.9627320	262	16.1864141	6.3988279
163	12.7671453	5.4625556	213	14.5945195	5.9720926	263	16.2172747	6.4069584
164	12.8062485	5.4737037	214	14.6287388	5.9814240	264	16.2480768	6.4150687
165	12.8452326	5.4848066	215	14.6628783	5.9907264	265	16.2788206	6.4231583
166	12.8840987	5.4958647	216	14.6969385	6.0000000	266	16.3095064	6.4312276
167	12.9228480	5.5068784	217	14.7309199	6.0092450	267	16.3401346	6.4392767
168	12.9614814	5.5178484	218	14.7648231	6.0184617	268	16.3707055	6.4473057
169	13.0000000	5.5287748	219	14.7986486	6.0276502	269	16.4012195	6.4553148
170	13.0384048	5.5396583	220	14.8323970	6.0368107	270	16.4316767	6.4633041
171	13.0766968	5.5504991	221	14.8660687	6.0459435	271	16.4620776	6.4712736
172	13.1148770	5.5612978	222	14.8996644	6.0550489	272	16.4924225	6.4792236
173	13.1529464	5.5720546	223	14.9331845	6.0641270	273	16.5227116	6.4871541
174	13.1909060	5.5827702	224	14.9666295	6.0731779	274	16.5529454	6.4950653
175	13.2287566	5.5934447	225	15.0000000	6.0822202	275	16.5831240	6.5029572
176	13.2664992	5.6040787	226	15.0332964	6.0911994	276	16.6132477	6.5108300
177	13.3041347	5.6146724	227	15.0665192	6.1001702	277	16.6433170	6.5186839
178	13.3416641	5.6252263	228	15.0996689	6.1091147	278	16.6733320	6.5265189
179	13.3790882	5.6357408	229	15.1327460	6.1180332	279	16.7032931	6.5343851
180	13.4164079	5.6462162	230	15.1657509	6.1269257	280	16.7332005	6.5421326
181	13.4536240	5.6566528	231	15.1986842	6.1357924	281	16.7630546	6.5499116
182	13.4907376	5.6670511	232	15.2315462	6.1446337	282	16.7928556	6.5576722
183	13.5277493	5.6774114	233	15.2643375	6.1534495	283	16.8226038	6.5654144
184	13.5646600	5.6877340	234	15.2970585	6.1622401	284	16.8522995	6.5731385
185	13.6014705	5.6980192	235	15.3297097	6.1710058	285	16.8819430	6.5808443
186	13.6381817	5.7082675	236	15.3622915	6.1797466	286	16.9115345	6.5885323
187	13.6747943	5.7184791	237	15.3948043	6.1884628	287	16.9410743	6.5962023
188	13.7113092	5.7286543	238	15.4272486	6.1971544	288	16.9705627	6.6038545
189	13.7477271	5.7387936	239	15.4596248	6.2058218	289	17.0000000	6.6114890
190	13.7840488	5.7488971	240	15.4919334	6.2144650	290	17.0293864	6.6191060
191	13.8202750	5.7589652	241	15.5241747	6.2230843	291	17.0587221	6.6267054
192	13.8564065	5.7689982	242	15.5563492	6.2316797	292	17.0880075	6.6342874
193	13.8924440	5.7789966	243	15.5884573	6.2402515	293	17.1172428	6.6418522
194	13.9283883	5.7889604	244	15.6204994	6.2487998	294	17.1464282	6.6493998
195	13.9642400	5.7988900	245	15.6524758	6.2573248	295	17.1755640	6.6569302
196	14.0000000	5.8087857	246	15.6843871	6.2658266	296	17.2046505	6.6644437
197	14.0356688	5.8186479	247	15.7162336	6.2743054	297	17.2336879	6.6719403
198	14.0712473	5.8284767	248	15.7480157	6.2827613	298	17.2626765	6.6794200
199	14.1067360	5.8382725	249	15.7797338	6.2911946	299	17.2916165	6.6868831
200	14.1421356	5.8480355	250	15.8113883	6.2996053	300	17.3205081	6.6943295

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
301	17.3493516	6.7017593	351	18.7349940	7.0540041	401	20.0249844	7.3741979
302	17.3781472	6.7091729	352	18.7616630	7.0606967	402	20.0499377	7.3803227
303	17.4068952	6.7165700	353	18.7882942	7.0673767	403	20.0748599	7.3864373
304	17.4355958	6.7239508	354	18.8148877	7.0740440	404	20.0997512	7.3925418
305	17.4642492	6.7313155	355	18.8414437	7.0806988	405	20.1246118	7.3986363
306	17.4928557	6.7386641	356	18.8679623	7.0873411	406	20.1494417	7.4047206
307	17.5214155	6.7459967	357	18.8944436	7.0939709	407	20.1742410	7.4107950
308	17.5499288	6.7533134	358	18.9208879	7.1005885	408	20.1990099	7.4168595
309	17.5783958	6.7606143	359	18.9472953	7.1071937	409	20.2237484	7.4229142
310	17.6068169	6.7678995	360	18.9736660	7.1137866	410	20.2484567	7.4289589
311	17.6351921	6.7751690	361	19.0000000	7.1203674	411	20.2731349	7.4349938
312	17.6635217	6.7824229	362	19.0262976	7.1269360	412	20.2977831	7.4410189
313	17.6918060	6.7896613	363	19.0525589	7.1334925	413	20.3224014	7.4470342
314	17.7200451	6.7968844	364	19.0787840	7.1400370	414	20.3469899	7.4530399
315	17.7482393	6.8040921	365	19.1049732	7.1465695	415	20.3715488	7.4590359
316	17.7763888	6.8112847	366	19.1311265	7.1530901	416	20.3960781	7.4650223
317	17.8044938	6.8184620	367	19.1572441	7.1595988	417	20.4205779	7.4709991
318	17.8325545	6.8256242	368	19.1833261	7.1660957	418	20.4450483	7.4769664
319	17.8605711	6.8327714	369	19.2093727	7.1725809	419	20.4694895	7.4829242
320	17.8885438	6.8399037	370	19.2353841	7.1790544	420	20.4939015	7.4888724
321	17.9164729	6.8470213	371	19.2613603	7.1855162	421	20.5182845	7.4948113
322	17.9443584	6.8541240	372	19.2873015	7.1919663	422	20.5426386	7.5007406
323	17.9722008	6.8612120	373	19.3132079	7.1984050	423	20.5669638	7.5066607
324	18.0000000	6.8682855	374	19.3390796	7.2048322	424	20.5912603	7.5125715
325	18.0277564	6.8753443	375	19.3649167	7.2112479	425	20.6155281	7.5184730
326	18.0554701	6.8823888	376	19.3907194	7.2176522	426	20.6397674	7.5243652
327	18.0831413	6.8894188	377	19.4164878	7.2240450	427	20.6639783	7.5302482
328	18.1107703	6.8964345	378	19.4422221	7.2304268	428	20.6881609	7.5361221
329	18.1383571	6.9034359	379	19.4679223	7.2367972	429	20.7123152	7.5419867
330	18.1659021	6.9104232	380	19.4935887	7.2431565	430	20.7364414	7.5478423
331	18.1934054	6.9173964	381	19.5192213	7.2495045	431	20.7605395	7.5536888
332	18.2208672	6.9243556	382	19.5448203	7.2558415	432	20.7846097	7.5595263
333	18.2482876	6.9313008	383	19.5703858	7.2621675	433	20.8086520	7.5653548
334	18.2756669	6.9382321	384	19.5959179	7.2684824	434	20.8326667	7.5711743
335	18.3030052	6.9451496	385	19.6214169	7.2747864	435	20.8566536	7.5769849
336	18.3303028	6.9520533	386	19.6468827	7.2810794	436	20.8806130	7.5827865
337	18.3575598	6.9589434	387	19.6723156	7.2873617	437	20.9045450	7.5885793
338	18.3847763	6.9658198	388	19.6977156	7.2936330	438	20.9284495	7.5943633
339	18.4119526	6.9726826	389	19.7230829	7.2998936	439	20.9523268	7.6001385
340	18.4390889	6.9795321	390	19.7484177	7.3061436	440	20.9761770	7.6059049
341	18.4661853	6.9863681	391	19.7737199	7.3123828	441	21.0000000	7.6116626
342	18.4932420	6.9931906	392	19.7989899	7.3186114	442	21.0237960	7.6174116
343	18.5202592	7.0000000	393	19.8242276	7.3248295	443	21.0475652	7.6231519
344	18.5472370	7.0067962	394	19.8494332	7.3310369	444	21.0713075	7.6288837
345	18.5741756	7.0135791	395	19.8746069	7.3372339	445	21.0950231	7.6346067
346	18.6010752	7.0203490	396	19.8997487	7.3434205	446	21.1187121	7.6403213
347	18.6279360	7.0271058	397	19.9248588	7.3495966	447	21.1423745	7.6460272
348	18.6547581	7.0338497	398	19.9499373	7.3557624	448	21.1660105	7.6517247
349	18.6815417	7.0405806	399	19.9749844	7.3619178	449	21.1896201	7.6574138
350	18.7082869	7.0472987	400	20.0000000	7.3680630	450	21.2132034	7.6630943

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
451	21.2367606	7.6687665	501	22.3830293	7.9422931	551	23.4733892	8.1981753
452	21.2602916	7.6744303	502	22.4053565	7.9475739	552	23.4946802	8.2031319
453	21.2837967	7.6800857	503	22.4276615	7.9528477	553	23.5159520	8.2080825
454	21.3072758	7.6857328	504	22.4499443	7.9581144	554	23.5372046	8.2130271
455	21.3307290	7.6913717	505	22.4722051	7.9633743	555	23.5584380	8.2179657
456	21.3541565	7.6970023	506	22.4944438	7.9686271	556	23.5796522	8.2228985
457	21.3775583	7.7026246	507	22.5166605	7.9738731	557	23.6008474	8.2278254
458	21.4009346	7.7082388	508	22.5388553	7.9791122	558	23.6220236	8.2327463
459	21.4242853	7.7138448	509	22.5610283	7.9843444	559	23.6431808	8.2376614
460	21.4476106	7.7194426	510	22.5831796	7.9895697	560	23.6643191	8.2425706
461	21.4709106	7.7250325	511	22.6053091	7.9947883	561	23.6854386	8.2474740
462	21.4941853	7.7306141	512	22.6274170	8.0000000	562	23.7065392	8.2523715
463	21.5174348	7.7361877	513	22.6495033	8.0052049	563	23.7276210	8.2572633
464	21.5406592	7.7417532	514	22.6715681	8.0104032	564	23.7486842	8.2621492
465	21.5638587	7.7473109	515	22.6936114	8.0155946	565	23.7697286	8.2670294
466	21.5870331	7.7528606	516	22.7156334	8.0207794	566	23.7907545	8.2719039
467	21.6101828	7.7584023	517	22.7376340	8.0259574	567	23.8117618	8.2767726
468	21.6333077	7.7639361	518	22.7596134	8.0311287	568	23.8327506	8.2816355
469	21.6564078	7.7694620	519	22.7815715	8.0362935	569	23.8537209	8.2864928
470	21.6794834	7.7749801	520	22.8035085	8.0414515	570	23.8746728	8.2913444
471	21.7025344	7.7804904	521	22.8254244	8.0466030	571	23.8956063	8.2961903
472	21.7255610	7.7859928	522	22.8473193	8.0517479	572	23.9165215	8.3010304
473	21.7485632	7.7914875	523	22.8691933	8.0568862	573	23.9374184	8.3058651
474	21.7715411	7.7969745	524	22.8910463	8.0620180	574	23.9582971	8.3106941
475	21.7944947	7.8024538	525	22.9128785	8.0671432	575	23.9791576	8.3155175
476	21.8174242	7.8079254	526	22.9346899	8.0722620	576	24.0000000	8.3203353
477	21.8403297	7.8133892	527	22.9564806	8.0773743	577	24.0208243	8.3251475
478	21.8632111	7.8188456	528	22.9782506	8.0824800	578	24.0416306	8.3299542
479	21.8860686	7.8242942	529	23.0000000	8.0875794	579	24.0624188	8.3347553
480	21.9089023	7.8297353	530	23.0217289	8.0926723	580	24.0831891	8.3395509
481	21.9317122	7.8351688	531	23.0434372	8.0977589	581	24.1039416	8.3443410
482	21.9544984	7.8405949	532	23.0651252	8.1028390	582	24.1246762	8.3491256
483	21.9772610	7.8460134	533	23.0867928	8.1079128	583	24.1453929	8.3539047
484	22.0000000	7.8514244	534	23.1084400	8.1129803	584	24.1660919	8.3586784
485	22.0227155	7.8568281	535	23.1300670	8.1180414	585	24.1867732	8.3634466
486	22.0454077	7.8622242	536	23.1516738	8.1230962	586	24.2074369	8.3682095
487	22.0680765	7.8676130	537	23.1732605	8.1281447	587	24.2280829	8.3729668
488	22.0907220	7.8729944	538	23.1948270	8.1331870	588	24.2487113	8.3777188
489	22.1133444	7.8783684	539	23.2163735	8.1382230	589	24.2693222	8.3824653
490	22.1359436	7.8837352	540	23.2379001	8.1432529	590	24.2899156	8.3872065
491	22.1585198	7.8890946	541	23.2594067	8.1482765	591	24.3104916	8.3919423
492	22.1810730	7.8944468	542	23.2808935	8.1532939	592	24.3310501	8.3966729
493	22.2036033	7.8997917	543	23.3023604	8.1583051	593	24.3515913	8.4013981
494	22.2261108	7.9051294	544	23.3238076	8.1633102	594	24.3721152	8.4061180
495	22.2485955	7.9104599	545	23.3452551	8.1683092	595	24.3926218	8.4108326
496	22.2710575	7.9157832	546	23.3666429	8.1733020	596	24.4131112	8.4155419
497	22.2934968	7.9210994	547	23.3880311	8.1782888	597	24.4335834	8.4202460
498	22.3159136	7.9264085	548	23.4093998	8.1832695	598	24.4540385	8.4249448
499	22.3383079	7.9317104	549	23.4307490	8.1882441	599	24.4744765	8.4296383
500	22.3606798	7.9370053	550	23.4520788	8.1932127	600	24.4948974	8.4343267

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
601	24.5153013	8.4390098	651	25.5147016	8.6668310	701	26.4764046	8.8832661
602	24.5356883	8.4436877	652	25.5342907	8.6712665	702	26.4952826	8.8874882
603	24.5560583	8.4483605	653	25.5538647	8.6756974	703	26.5141472	8.8917063
604	24.5764115	8.4530281	654	25.5734237	8.6801237	704	26.5329983	8.8959204
605	24.5967478	8.4576906	655	25.5929678	8.6845456	705	26.5518361	8.9001304
606	24.6170673	8.4623479	656	25.6124969	8.6889630	706	26.5706605	8.9043366
607	24.6373700	8.4670001	657	25.6320112	8.6933759	707	26.5894716	8.9085387
608	24.6576560	8.4716471	658	25.6515107	8.6977843	708	26.6082694	8.9127369
609	24.6779254	8.4762892	659	25.6709553	8.7021882	709	26.6270539	8.9169311
610	24.6981781	8.4809261	660	25.6904652	8.7065877	710	26.6458252	8.9211214
611	24.7184142	8.4855579	661	25.7099203	8.7109827	711	26.6645833	8.9253078
612	24.7386338	8.4901848	662	25.7293607	8.7153734	712	26.6833281	8.9294902
613	24.7588368	8.4948065	663	25.7487864	8.7197596	713	26.7020598	8.9336687
614	24.7790234	8.4994233	664	25.7681975	8.7241414	714	26.7207784	8.9378433
615	24.7991935	8.5040350	665	25.7875939	8.7285187	715	26.7394839	8.9420140
616	24.8193473	8.5086417	666	25.8069758	8.7328918	716	26.7581763	8.9461809
617	24.8394847	8.5132435	667	25.8263431	8.7372604	717	26.7768557	8.9503438
618	24.8596058	8.5178403	668	25.8456960	8.7416246	718	26.7955220	8.9545029
619	24.8797106	8.5224321	669	25.8650343	8.7459846	719	26.8141754	8.9586581
620	24.8997992	8.5270189	670	25.8843582	8.7503401	720	26.8328157	8.9628095
621	24.9198716	8.5316009	671	25.9036677	8.7546913	721	26.8514432	8.9669570
622	24.9399278	8.5361780	672	25.9229628	8.7590383	722	26.8700577	8.9711007
623	24.9599679	8.5407501	673	25.9422435	8.7633809	723	26.8886593	8.9752406
624	24.9799920	8.5453173	674	25.9615100	8.7677192	724	26.9072481	8.9793766
625	25.0000000	8.5498797	675	25.9807621	8.7720532	725	26.9258240	8.9835089
626	25.0199920	8.5544372	676	26.0000000	8.7763830	726	26.9443872	8.9876373
627	25.0399681	8.5589899	677	26.0192237	8.7807084	727	26.9629375	8.9917620
628	25.0599282	8.5635377	678	26.0384331	8.7850296	728	26.9814751	8.9958829
629	25.0798724	8.5680807	679	26.0576284	8.7893466	729	27.0000000	9.0000000
630	25.0998008	8.5726189	680	26.0768096	8.7936593	730	27.0185122	9.0041134
631	25.1197134	8.5771523	681	26.0959767	8.7979679	731	27.0370117	9.0082229
632	25.1396102	8.5816809	682	26.1151297	8.8022721	732	27.0554985	9.0123288
633	25.1594913	8.5862047	683	26.1342667	8.8065722	733	27.0739727	9.0164309
634	25.1793566	8.5907238	684	26.1533937	8.8108681	734	27.0924344	9.0205293
635	25.1992063	8.5952380	685	26.1725047	8.8151598	735	27.1108834	9.0246239
636	25.2190404	8.5997476	686	26.1916017	8.8194474	736	27.1293199	9.0287149
637	25.2388589	8.6042525	687	26.2106848	8.8237307	737	27.1477439	9.0328021
638	25.2586619	8.6087526	688	26.2297541	8.8280099	738	27.1661554	9.0368857
639	25.2784493	8.6132480	689	26.2488095	8.8322850	739	27.1845544	9.0409655
640	25.2982213	8.6177388	690	26.2678511	8.8365559	740	27.2029410	9.0450419
641	25.3179778	8.6222248	691	26.2868789	8.8408227	741	27.2213152	9.0491142
642	25.3377189	8.6267063	692	26.3058929	8.8450854	742	27.2396769	9.0531831
643	25.3574447	8.6311830	693	26.3248932	8.8493440	743	27.2580263	9.0572482
644	25.3771551	8.6356551	694	26.3438797	8.8535985	744	27.2763634	9.0613098
645	25.3968502	8.6401226	695	26.3628527	8.8578489	745	27.2946881	9.0653677
646	25.4165301	8.6445855	696	26.3818119	8.8620952	746	27.3130006	9.0694220
647	25.4361947	8.6490437	697	26.4007576	8.8663375	747	27.3313007	9.0734726
648	25.4558441	8.6534974	698	26.4196896	8.8705757	748	27.3495887	9.0775197
649	25.4754784	8.6579465	699	26.4386081	8.8748099	749	27.3678644	9.0815631
650	25.4950976	8.6623911	700	26.4575131	8.8790400	750	27.3861279	9.0856030

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
751	27.4043792	9.0896392	801	28.3019434	9.2870440	851	29.1719043	9.4763957
752	27.4226184	9.0936719	802	28.3196045	9.2909072	852	29.1890390	9.4801061
753	27.4408455	9.0977010	803	28.3372546	9.2947671	853	29.2061637	9.4838136
754	27.4590604	9.1017265	804	28.3548938	9.2986239	854	29.2232784	9.4875182
755	27.4772633	9.1057485	805	28.3725219	9.3024775	855	29.2403830	9.4912200
756	27.4954542	9.1097669	806	28.3901391	9.3063278	856	29.2574777	9.4949188
757	27.5136330	9.1137818	807	28.4077454	9.3101750	857	29.2745623	9.4986147
758	27.5317998	9.1177931	808	28.4253408	9.3140190	858	29.2916370	9.5023078
759	27.5499546	9.1218010	809	28.4429253	9.3178599	859	29.3087018	9.5059980
760	27.5680975	9.1258053	810	28.4604989	9.3216975	860	29.3257566	9.5096854
761	27.5862284	9.1298061	811	28.4780617	9.3255320	861	29.3428015	9.5133699
762	27.6043475	9.1338034	812	28.4956137	9.3293634	862	29.3598365	9.5170515
763	27.6224546	9.1377974	813	28.5131549	9.3331916	863	29.3768616	9.5207303
764	27.6405499	9.1417874	814	28.5306852	9.3370167	864	29.3938769	9.5244063
765	27.6586334	9.1457742	815	28.5482048	9.3408386	865	29.4108823	9.5280794
766	27.6767050	9.1497576	816	28.5657137	9.3446575	866	29.4278779	9.5317497
767	27.6947648	9.1537375	817	28.5832119	9.3484731	867	29.4448637	9.5354172
768	27.7128129	9.1577139	818	28.6006993	9.3522857	868	29.4618397	9.5390818
769	27.7308492	9.1616869	819	28.6181760	9.3560952	869	29.4788059	9.5427437
770	27.7488739	9.1656565	820	28.6356421	9.3599016	870	29.4957624	9.5464027
771	27.7668868	9.1696225	821	28.6530976	9.3637049	871	29.5127091	9.5500589
772	27.7848880	9.1735852	822	28.6705424	9.3675051	872	29.5296461	9.5537123
773	27.8028775	9.1775445	823	28.6879766	9.3713022	873	29.5465734	9.5573630
774	27.8208555	9.1815003	824	28.7054002	9.3750963	874	29.5634910	9.5610108
775	27.8388218	9.1854527	825	28.7228132	9.3788873	875	29.5803989	9.5646559
776	27.8567766	9.1894018	826	28.7402157	9.3826752	876	29.5972972	9.5682932
777	27.8747197	9.1933474	827	28.7576077	9.3864600	877	29.6141858	9.5719377
778	27.8926514	9.1972897	828	28.7749891	9.3902419	878	29.6310648	9.5755545
779	27.9105715	9.2012286	829	28.7923601	9.3940206	879	29.6479342	9.5792085
780	27.9284801	9.2051641	830	28.8097206	9.3977964	880	29.6647939	9.5828397
781	27.9463772	9.2090962	831	28.8270706	9.4015691	881	29.6816442	9.5864682
782	27.9642629	9.2130250	832	28.8444102	9.4053387	882	29.6984848	9.5900939
783	27.9821372	9.2169505	833	28.8617394	9.4091054	883	29.7153159	9.5937169
784	28.0000000	9.2208726	834	28.8790582	9.4128690	884	29.7321375	9.5973373
785	28.0178515	9.2247914	835	28.8963666	9.4166297	885	29.7489496	9.6009548
786	28.0356915	9.2287068	836	28.9136646	9.4203873	886	29.7657521	9.6045696
787	28.0535203	9.2326189	837	28.9309523	9.4241420	887	29.7825452	9.6081817
788	28.0713377	9.2365277	838	28.9482297	9.4278936	888	29.7993289	9.6117911
789	28.0891438	9.2404333	839	28.9654967	9.4316423	889	29.8161030	9.6153977
790	28.1069386	9.2443355	840	28.9827535	9.4353880	890	29.8328678	9.6190017
791	28.1247222	9.2482344	841	29.0000000	9.4391307	891	29.8496231	9.6226030
792	28.1424946	9.2521300	842	29.0172363	9.4428704	892	29.8663690	9.6262016
793	28.1602557	9.2560224	843	29.0344623	9.4466072	893	29.8831056	9.6297975
794	28.1780056	9.2599114	844	29.0516781	9.4503410	894	29.8998328	9.6333907
795	28.1957444	9.2637973	845	29.0688837	9.4540719	895	29.9165506	9.6369812
796	28.2134720	9.2676798	846	29.0860791	9.4577999	896	29.9332591	9.6405690
797	28.2311884	9.2715592	847	29.1032644	9.4615249	897	29.9499583	9.6441542
798	28.2488938	9.2754352	848	29.1204396	9.4652470	898	29.9666481	9.6477367
799	28.2665881	9.2793081	849	29.1376046	9.4689661	899	29.9833287	9.6513166
800	28.2842712	9.2831777	850	29.1547595	9.4726824	900	30.0000000	9.6548938

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
901	30.0166620	9.6584684	951	30.8382879	9.8339238	1001	31.6385840	10.0033322
902	30.0333148	9.6620403	952	30.8544972	9.8373695	1002	31.6543836	10.0066622
903	30.0499584	9.6656096	953	30.8706984	9.8408127	1003	31.6701752	10.0099899
904	30.0675928	9.6691762	954	30.8868904	9.8442536	1004	31.6859590	10.0133155
905	30.0832179	9.6727403	955	30.9030743	9.8476920	1005	31.7017349	10.0166389
906	30.0998339	9.6763017	956	30.9192497	9.8511280	1006	31.7175030	10.0199601
907	30.1164407	9.6798604	957	30.9354166	9.8545617	1007	31.7332633	10.0232791
908	30.1330383	9.6834166	958	30.9515751	9.8579929	1008	31.7490157	10.0265958
909	30.1496269	9.6869701	959	30.9677251	9.8614218	1009	31.7647603	10.0299104
910	30.1662063	9.6905211	960	30.9838668	9.8648483	1010	31.7804972	10.0332228
911	30.1827765	9.6940694	961	31.0000000	9.8682724	1011	31.7962262	10.0365330
912	30.1993377	9.6976151	962	31.0161248	9.8716941	1012	31.8119474	10.0398410
913	30.2158899	9.7011583	963	31.0322413	9.8751135	1013	31.8276609	10.0431469
914	30.2324329	9.7046989	964	31.0483494	9.8785305	1014	31.8433666	10.0464506
915	30.2489669	9.7082369	965	31.0644491	9.8819451	1015	31.8590646	10.0497521
916	30.2654919	9.7117723	966	31.0805405	9.8853574	1016	31.8747549	10.0530514
917	30.2820079	9.7153051	967	31.0966236	9.8887673	1017	31.8904374	10.0563485
918	30.2985148	9.7188354	968	31.1126984	9.8921749	1018	31.9061123	10.0596435
919	30.3150128	9.7223631	969	31.1287648	9.8955801	1019	31.9217794	10.0629364
920	30.3315018	9.7258883	970	31.1448230	9.8989830	1020	31.9374388	10.0662271
921	30.3479818	9.7294109	971	31.1608729	9.9023835	1021	31.9530906	10.0695156
922	30.3644529	9.7329309	972	31.1769145	9.9057817	1022	31.9687347	18.0728020
923	30.3809151	9.7364484	973	31.1929479	9.9091776	1023	31.9843712	10.0760863
924	30.3973683	9.7399634	974	31.2089731	9.9125712	1024	32.0000000	10.0793684
925	30.4138127	9.7434758	975	31.2249900	9.9159624	1025	32.0156212	10.0826484
926	30.4302481	9.7469857	976	31.2409987	9.9193513	1026	32.0312348	10.0859262
927	30.4466747	9.7504930	977	31.2569992	9.9227379	1027	32.0468407	10.0892019
928	30.4630924	9.7539979	978	31.2729915	9.9261222	1028	32.0624391	10.0924755
929	30.4795013	9.7575002	979	31.2889757	9.9295042	1029	32.0780298	10.0957469
930	30.4959014	9.7610001	980	31.3049517	9.9328839	1030	32.0936131	10.0990163
931	30.5122926	9.7644974	981	31.3209195	9.9362613	1031	32.1091887	10.1022835
932	30.5286750	9.7679922	982	31.3368792	9.9396363	1032	32.1247568	10.1055487
933	30.5450487	9.7714845	983	31.3528308	9.9430092	1033	32.1403173	10.1088117
934	30.5614136	9.7749743	984	31.3687743	9.9463797	1034	32.1558704	10.1120726
935	30.5777097	9.7784616	985	31.3847097	9.9497479	1035	32.1714159	10.1153314
936	30.5941171	9.7829466	986	31.4006369	9.9531138	1036	32.1869539	10.1185882
937	30.6104557	9.7854288	987	31.4165561	9.9564775	1037	32.2024844	10.1218428
938	30.6267857	9.7889087	988	31.4324673	9.9598389	1038	32.2180074	10.1250953
939	30.6431069	9.7923861	989	31.4483704	9.9631981	1039	32.2335229	10.1283457
940	30.6594194	9.7958611	990	31.4642654	9.9665549	1040	32.2490310	10.1315941
941	30.6757233	9.7993336	991	31.4801525	9.9699095	1041	32.2645316	10.1348403
942	30.6920185	9.8028036	992	31.4960315	9.9732619	1042	32.2800248	10.1380845
943	30.7083051	9.8062711	993	31.5119025	9.9766120	1043	32.2955105	10.1413266
944	30.7245830	9.8097362	994	31.5277655	9.9799599	1044	32.3109888	10.1445667
945	30.7408523	9.8131989	995	31.5436206	9.9833055	1045	32.3264598	10.1478047
946	30.7571130	9.8166591	996	31.5594677	9.9866488	1046	32.3419233	10.1510406
947	30.7733651	9.8201169	997	31.5753068	9.9899900	1047	32.3573794	10.1542744
948	30.7896086	9.8235723	998	31.5911380	9.9933289	1048	32.3728281	10.1575062
949	30.8058436	9.8270252	999	31.6069613	9.9966656	1049	32.3882695	10.1607359
950	30.8220700	9.8304757	1000	31.6227766	10.0000000	1050	32.4037035	10.1639636

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
751	27.4043792	9.0896392	801	28.3019434	9.2870440	851	29.1719043	9.4763957
752	27.4226184	9.0936719	802	28.3196045	9.2909072	852	29.1890390	9.4801061
753	27.4408455	9.0977010	803	28.3372546	9.2947671	853	29.2061637	9.4838136
754	27.4590604	9.1017265	804	28.3548938	9.2986239	854	29.2232784	9.4875182
755	27.4772633	9.1057485	805	28.3725219	9.3024775	855	29.2403830	9.4912200
756	27.4954542	9.1097669	806	28.3901391	9.3063278	856	29.2574777	9.4949188
757	27.5136330	9.1137818	807	28.4077454	9.3101750	857	29.2745623	9.4986147
758	27.5317998	9.1177931	808	28.4253408	9.3140190	858	29.2916370	9.5023078
759	27.5499546	9.1218010	809	28.4429253	9.3178599	859	29.3087018	9.5059980
760	27.5680975	9.1258053	810	28.4604989	9.3216975	860	29.3257566	9.5096854
761	27.5862284	9.1298061	811	28.4780617	9.3255320	861	29.3428015	9.5133699
762	27.6043475	9.1338034	812	28.4956137	9.3293634	862	29.3598365	9.5170515
763	27.6224546	9.1377974	813	28.5131549	9.3331916	863	29.3768616	9.5207303
764	27.6405499	9.1417874	814	28.5306852	9.3370167	864	29.3938769	9.5244063
765	27.6586334	9.1457742	815	28.5482048	9.3408386	865	29.4108823	9.5280794
766	27.6767050	9.1497576	816	28.5657137	9.3446575	866	29.4278779	9.5317497
767	27.6947648	9.1537375	817	28.5832119	9.3484731	867	29.4448637	9.5354172
768	27.7128129	9.1577139	818	28.6006993	9.3522857	868	29.4618397	9.5390818
769	27.7308492	9.1616869	819	28.6181760	9.3560952	869	29.4788059	9.5427437
770	27.7488739	9.1656565	820	28.6356421	9.3599016	870	29.4957624	9.5464027
771	27.7668868	9.1696225	821	28.6530976	9.3637049	871	29.5127091	9.5500589
772	27.7848880	9.1735852	822	28.6705424	9.3675051	872	29.5296461	9.5537123
773	27.8028775	9.1775445	823	28.6879766	9.3713022	873	29.5465734	9.5573630
774	27.8208555	9.1815003	824	28.7054002	9.3750963	874	29.5634910	9.5610108
775	27.8388218	9.1854527	825	28.7228132	9.3788873	875	29.5803989	9.5646559
776	27.8567766	9.1894018	826	28.7402157	9.3826752	876	29.5972972	9.5682932
777	27.8747197	9.1933474	827	28.7576077	9.3864600	877	29.6141858	9.5719377
778	27.8926514	9.1972897	828	28.7749891	9.3902419	878	29.6310648	9.5755545
779	27.9105715	9.2012286	829	28.7923601	9.3940206	879	29.6479342	9.5792085
780	27.9284801	9.2051641	830	28.8097206	9.3977964	880	29.6647939	9.5828397
781	27.9463772	9.2090962	831	28.8270706	9.4015691	881	29.6816442	9.5864682
782	27.9642629	9.2130250	832	28.8444102	9.4053387	882	29.6984848	9.5900939
783	27.9821372	9.2169505	833	28.8617394	9.4091054	883	29.7153159	9.5937169
784	28.0000000	9.2208726	834	28.8790582	9.4128690	884	29.7321375	9.5973373
785	28.0178515	9.2247914	835	28.8963666	9.4166297	885	29.7489496	9.6009548
786	28.0357015	9.2287068	836	28.9136646	9.4203873	886	29.7657521	9.6045696
787	28.0535203	9.2326189	837	28.9309523	9.4241420	887	29.7825452	9.6081817
788	28.0713377	9.2365277	838	28.9482297	9.4278936	888	29.7993289	9.6117911
789	28.0891438	9.2404333	839	28.9654967	9.4316423	889	29.8161030	9.6153977
790	28.1069386	9.2443355	840	28.9827535	9.4353880	890	29.8328678	9.6190017
791	28.1247222	9.2482344	841	29.0000000	9.4391307	891	29.8496231	9.6226030
792	28.1424946	9.2521300	842	29.0172363	9.4428704	892	29.8663690	9.6262016
793	28.1602557	9.2560224	843	29.0344623	9.4466072	893	29.8831056	9.6297975
794	28.1780056	9.2599114	844	29.0516781	9.4503410	894	29.8998328	9.6333907
795	28.1957444	9.2637973	845	29.0688837	9.4540719	895	29.9165506	9.6369812
796	28.2134720	9.2676798	846	29.0860791	9.4577999	896	29.9332591	9.6405690
797	28.2311884	9.2715592	847	29.1032644	9.4615249	897	29.9499583	9.6441542
798	28.2488938	9.2754352	848	29.1204396	9.4652470	898	29.9666481	9.6477367
799	28.2665881	9.2793081	849	29.1376046	9.4689661	899	29.9833287	9.6513166
800	28.2842712	9.2831777	850	29.1547595	9.4726824	900	30.0000000	9.6548938

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
901	30.0166620	9.6584684	951	30.8382879	9.8339238	1001	31.6385840	10.0033322
902	30.0333148	9.6620403	952	30.8544972	9.8373695	1002	31.6543836	10.0066622
903	30.0499584	9.6656096	953	30.8706984	9.8408127	1003	31.6701752	10.0099899
904	30.0675928	9.6691762	954	30.8868904	9.8442536	1004	31.6859590	10.0133155
905	30.0832179	9.6727403	955	30.9030743	9.8476920	1005	31.7017349	10.0166389
906	30.0998339	9.6763017	956	30.9192497	9.8511280	1006	31.7175030	10.0199601
907	30.1164407	9.6798604	957	30.9354166	9.8545617	1007	31.7332633	10.0232791
908	30.1330383	9.6834166	958	30.9515751	9.8579929	1008	31.7490157	10.0265958
909	30.1496269	9.6869701	959	30.9677251	9.8614218	1009	31.7647603	10.0299104
910	30.1662063	9.6905211	960	30.9838668	9.8648483	1010	31.7804972	10.0332228
911	30.1827765	9.6940694	961	31.0000000	9.8682724	1011	31.7962262	10.0365330
912	30.1993377	9.6976151	962	31.0161248	9.8716941	1012	31.8119474	10.0398410
913	30.2158899	9.7011583	963	31.0322413	9.8751135	1013	31.8276609	10.0431469
914	30.2324329	9.7046989	964	31.0483494	9.8785305	1014	31.8433666	10.0464506
915	30.2489669	9.7082369	965	31.0644491	9.8819451	1015	31.8590646	10.0497521
916	30.2654919	9.7117723	966	31.0805405	9.8853574	1016	31.8747549	10.0530514
917	30.2820079	9.7153051	967	31.0966236	9.8887673	1017	31.8904374	10.0563485
918	30.2985148	9.7188354	968	31.1126984	9.8921749	1018	31.9061123	10.0596435
919	30.3150128	9.7223631	969	31.1287648	9.8955801	1019	31.9217794	10.0629364
920	30.3315018	9.7258883	970	31.1448230	9.8989830	1020	31.9374388	10.0662271
921	30.3479818	9.7294109	971	31.1608729	9.9023835	1021	31.9530906	10.0695156
922	30.3644529	9.7329309	972	31.1769145	9.9057817	1022	31.9687347	18.0728020
923	30.3809151	9.7364484	973	31.1929479	9.9091776	1023	31.9843712	10.0760863
924	30.3973683	9.7399634	974	31.2089731	9.9125712	1024	32.0000000	10.0793684
925	30.4138127	9.7434758	975	31.2249900	9.9159624	1025	32.0156212	10.0826484
926	30.4302481	9.7469857	976	31.2409987	9.9193513	1026	32.0312348	10.0859262
927	30.4466747	9.7504930	977	31.2569992	9.9227379	1027	32.0468407	10.0892019
928	30.4630924	9.7539979	978	31.2729915	9.9261222	1028	32.0624391	10.0924755
929	30.4795013	9.7575002	979	31.2889757	9.9295042	1029	32.0780298	10.0957469
930	30.4959014	9.7610001	980	31.3049517	9.9328839	1030	32.0936131	10.0990163
931	30.5122926	9.7644974	981	31.3209195	9.9362613	1031	32.1091887	10.1022835
932	30.5286750	9.7679922	982	31.3368792	9.9396363	1032	32.1247568	10.1055487
933	30.5450487	9.7714845	983	31.3528303	9.9430092	1033	32.1403173	10.1088117
934	30.5614136	9.7749743	984	31.3687743	9.9463797	1034	32.1558704	10.1120726
935	30.5777697	9.7784616	985	31.3847097	9.9497479	1035	32.1714159	10.1153314
936	30.5941171	9.7829466	986	31.4006369	9.9531138	1036	32.1869539	10.1185882
937	30.6104557	9.7854288	987	31.4165561	9.9564775	1037	32.2024844	10.1218428
938	30.6267857	9.7889087	988	31.4324673	9.9598389	1038	32.2180074	10.1250953
939	30.6431069	9.7923861	989	31.4483704	9.9631981	1039	32.2335229	10.1283457
940	30.6594194	9.7958611	990	31.4642654	9.9665549	1040	32.2490310	10.1315941
941	30.6757233	9.7993336	991	31.4801525	9.9699095	1041	32.2645316	10.1348403
942	30.6920185	9.8028036	992	31.4960315	9.9732619	1042	32.2800248	10.1380845
943	30.7083051	9.8062711	993	31.5119025	9.9766120	1043	32.2955105	10.1413266
944	30.7245830	9.8097362	994	31.5277655	9.9799599	1044	32.3109888	10.1445667
945	30.7408523	9.8131989	995	31.5436206	9.9833055	1045	32.3264598	10.1478047
946	30.7571130	9.8166591	996	31.5594677	9.9866488	1046	32.3419233	10.1510406
947	30.7733651	9.8201169	997	31.5753068	9.9899900	1047	32.3573794	10.1542744
948	30.7896086	9.8235723	998	31.5911380	9.9933289	1048	32.3728281	10.1575062
949	30.8058436	9.8270252	999	31.6069613	9.9966656	1049	32.3882695	10.1607359
950	30.8220700	9.8304757	1000	31.6227766	10.0000000	1050	32.4037035	10.1639636

ROOT.

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
1051	32.4191301	10.1671893	1101	33.1813200	10.3259284	1151	33.9263909	10.4799314
1052	32.4345495	10.1704129	1102	33.1963853	10.3290537	1152	33.9411255	10.4829656
1053	32.4499615	10.1736344	1103	33.2114438	10.3321770	1153	33.9558537	10.4859980
1054	32.4653662	10.1768539	1104	33.2264955	10.3352985	1154	33.9705755	10.4890286
1055	32.4807635	10.1800714	1105	33.2415403	10.3384181	1155	33.9852910	10.4920575
1056	32.4961536	10.1832868	1106	33.2565783	10.3415358	1156	34.0000000	10.4950847
1057	32.5115364	10.1865002	1107	33.2716095	10.3446517	1157	34.0147027	10.4981101
1058	32.5269119	10.1897116	1108	33.2866339	10.3477657	1158	34.0293990	10.5011337
1059	32.5422802	10.1929209	1109	33.3016516	10.3508778	1159	34.0440890	10.5041556
1060	32.5576412	10.1961283	1110	33.3166625	10.3539880	1160	34.0587727	10.5071757
1061	32.5729949	10.1993336	1111	33.3316666	10.3570964	1161	34.0734501	10.5101942
1062	32.5883415	10.2025369	1112	33.3466640	10.3602029	1162	34.0881211	10.5132109
1063	32.6036807	10.2057382	1113	33.3616546	10.3633076	1163	34.1027858	10.5162259
1064	32.6190129	10.2089375	1114	33.3766385	10.3664103	1164	34.1174442	10.5192391
1065	32.6343377	10.2121347	1115	33.3916157	10.3695113	1165	34.1320963	10.5222506
1066	32.6496554	10.2153300	1116	33.4065862	10.3726103	1166	34.1467422	10.5252604
1067	32.6649659	10.2185233	1117	33.4215499	10.3757076	1167	34.1613817	10.5282685
1068	32.6802693	10.2217146	1118	33.4365070	10.3788030	1168	34.1760150	10.5312749
1069	32.6955654	10.2249039	1119	33.4514573	10.3818965	1169	34.1906420	10.5342795
1070	32.7108544	10.2280912	1120	33.4664011	10.3849882	1170	34.2052627	10.5372825
1071	32.7261363	10.2312766	1121	33.4813381	10.3880781	1171	34.2198773	10.5402837
1072	32.7414111	10.2344599	1122	33.4962684	10.3911661	1172	34.2344855	10.5432832
1073	32.7566787	10.2376413	1123	33.5111921	10.3942523	1173	34.2490875	10.5462810
1074	32.7719392	10.2408207	1124	33.5261092	10.3973366	1174	34.2636834	10.5492771
1075	32.7871926	10.2439981	1125	33.5410196	10.4004192	1175	34.2782730	10.5522715
1076	32.8024389	10.2471735	1126	33.5559234	10.4934999	1176	34.2928564	10.5552642
1077	32.8176782	10.2503470	1127	33.5708206	10.4065787	1177	34.3074336	10.5582552
1078	32.8329103	10.2535186	1128	33.5857112	10.4096557	1178	34.3220046	10.5612445
1079	32.8481354	10.2566881	1129	33.6005952	10.4127310	1179	34.3365694	10.5642322
1080	32.8633535	10.2598557	1130	33.6154726	10.4158044	1180	34.3511281	10.5672181
1081	32.8785644	10.2630213	1131	33.6303434	10.4188760	1181	34.3656805	10.5702024
1082	32.8937684	10.2661850	1132	33.6452077	10.4219458	1182	34.3802268	10.5731849
1083	32.9089653	10.2693467	1133	33.6600653	10.4250138	1183	34.3947670	10.5761658
1084	32.9241553	10.2725065	1134	33.6749165	10.4280800	1184	34.4093011	10.5791449
1085	32.9393382	10.2756644	1135	33.6897610	10.4311443	1185	34.4238289	10.5821225
1086	32.9545141	10.2788203	1136	33.7045991	10.4342069	1186	34.4383507	10.5850983
1087	32.9696830	10.2819743	1137	33.7194306	10.4372677	1187	34.4528663	10.5880725
1088	32.9848450	10.2851264	1138	33.7342556	10.4403267	1188	34.4673759	10.5910450
1089	33.0000000	10.2882765	1139	33.7490741	10.4433839	1189	34.4818793	10.5940158
1090	33.0151480	10.2914247	1140	33.7638860	10.4464393	1190	34.4963766	10.5969850
1091	33.0302891	10.2945709	1141	33.7786915	10.4494929	1191	34.5108678	10.5999525
1092	33.0454233	10.2977153	1142	33.7934905	10.4525448	1192	34.5253530	10.6029184
1093	33.0605505	10.3008577	1143	33.8082830	10.4555948	1193	34.5398321	10.6058826
1094	33.0756708	10.3039982	1144	33.8230691	10.4586431	1194	34.5543051	10.6088451
1095	33.0907842	10.3071368	1145	33.8378486	10.4616896	1195	34.5687720	10.6118060
1096	33.1058907	10.3102735	1146	33.8526218	10.4647343	1196	34.5832329	10.6147652
1097	33.1209903	10.3134083	1147	33.8673884	10.4677773	1197	34.5976879	10.6177228
1098	33.1360830	10.3165411	1148	33.8821487	10.4708185	1198	34.6121366	10.6206788
1099	33.1511689	10.3196721	1149	33.8969025	10.4738579	1199	34.6265794	10.6236331
1100	33.1662479	10.3228012	1150	33.9116409	10.4768955	1200	34.6410162	10.6265857

ROOT, *False*. See FALSE.

ROOT, *Impossible*, is not only the square root of a negative quantity, but any other root denominated by any even number. Thus $\sqrt[4]{-1}$, $\sqrt[6]{-1}$, $\sqrt[8]{-1}$, or in general $\sqrt[2m]{-1}$, $\sqrt[2m]{-x}$, are all *impossible* roots, or quantities. Some call them imaginary roots or quantities. See FALSE Root.

ROOT, *Real*. See FALSE Root.

ROOT, *Residual*. See RESIDUAL.

ROOTS of Equations, *Extraction of the*. See EXTRACTION, REDUCTION of Equations, and ROOT of an Equation, *supra*.

ROOTS, *Radices*, in Grammar, are the primitive words of a language, whence others are compounded or derived.

Thus the Latin *fluo* is the root of *fluens*, *fluxio*, *flumen*, *fluvialis*, *influxus*, *refluens*, *fluatifer*, *fluatijonus*, *fluativagus*, &c. Thus also the Greek $\rho\omicron\upsilon\varsigma$ is the root of $\rho\omicron\upsilon\omicron\varsigma$, $\rho\omicron\upsilon\omicron\varsigma$, $\rho\omicron\upsilon\omicron\varsigma$, $\rho\omicron\upsilon\omicron\varsigma$, &c.

And thus also, though in a less proper sense, the Danish *rod* is the root of the English word *root*; the Latin *radix* the root of the French *racine*, as *rado* is the root of *radix*; and perhaps $\rho\omicron\upsilon\varsigma$ the root of *rado*.

Roots, in the Hebrew language, consist of those letters that are denominated *radical* (which see), and are generally verbs, consisting commonly of three, sometimes of two, and rarely of four letters. Of whatever letters, whether radical or servile, any word consists, it must, at least, contain one of a radical character. The investigation of the radical and a primitive is an object of importance in grammar. In order to facilitate their investigation in the Hebrew, and other Eastern languages, it is necessary to be well acquainted with the division of the letters into *radical* and *servile* (see each term), because these last must be rejected before the root is obtained.

If the root consist of pure radicals, commonly *three* in number, it is easily found, and as easily divested of the serviles which attend it. But, as the servile letters may also constitute roots, it is sometimes a matter of difficulty to distinguish when these letters ought to be considered in their *radical*, and when in their *servile* capacity. This difficulty is increased in the verbs denominated *imperfect*. For, in some of their parts, either by contraction, or commutation, these verbs lose sometimes one, sometimes two, of their radical letters, which must be restored to their place before the root can be exhibited in its true form.

The learner must therefore endeavour, by frequent practice, to acquire a dexterity in discovering the radical letters, in divesting them of their serviles, and in restoring them where they are lost by the abbreviated flexions. This exercise is the more necessary, as, in almost all lexicons, the words are arranged according to the alphabetical order of the roots. These are commonly printed in a larger character, and have below them their derivatives, as children and descendants. By this plan, neither the signification of any verb, nor of any noun derived from it, can be found, till its root be investigated and determined.

The following directions will be found useful in the investigation of radical words.

The chief things to be attended to are, what letters are commonly servile, either in nouns or verbs; in what part of the word they most generally appear; and what is the most probable conjecture to be formed, in order to restore such radicals as are lost by the abbreviated flexions.

The servile letters in nouns are such as form the feminine gender, and the plural terminations, the prefixes, including

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the signs of the cases, the hæmantic letters, and the possessive pronouns, or affixes.

The servile letters in verbs are the personal prefixes and postfixes, formerly named the *pronominal serviles*, the characteristics of the different forms, and the verbal affixes.

γ and ϑ whether inserted in nouns or verbs, must be rejected in the investigation of the root.

As the serviles generally appear in greatest number at the end of words, the most proper method of discovering the root seems to be this:

Begin from the left hand, remove the serviles as you go along, retain the pure and the supposed radicals, reject the inserted γ and ϑ, restore or commute the radicals lost by abbreviations, and, finally, reject the prefixes.

Directions for finding the Root, and for restoring the deficient Radicals.

I. If, after rejecting the serviles, three pure radicals remain, you may conclude these to be the root.

II. If only two remain, as is the common case in abbreviated roots, prefix to these either γ or ϑ or insert γ betwixt them, or postpone γ or double the second.

The investigation of roots is not peculiar to the Hebrew, but common to all languages, and is of singular advantage, if we would attend to accuracy and propriety of writing.

In such languages as do not admit of the distinction between radical and servile letters, the following may be observed as general rules for reducing words to their first principles. Let that part of the word which remains unvaried be considered as the radical term, and let the changes of termination be disregarded, or cut off. Compound words must be resolved into their component parts, and the prepositions excluded. In those words which seem reducible to Hebrew roots consisting entirely of consonants, the intermediate vowels employed for their enunciation, are not to be considered as essential, or as constituting a part of the root. See Wilson's Elements of Hebrew Grammar. Masclef Gram. Heb. vol. i. c. 21. p. 214, &c. Robertson's Gram. Heb. Appendix, iii.

The Greek and Hebrew tongues are learnt by roots. Of dictionaries, some are in alphabetical order, others are disposed by roots, as Scapula, Faber's Thesaurus, and the first edition of the Dictionary of the French Academy. In the edition of 1718, this last is thrown into the usual alphabetical order.

ROOTS, in *Geography*, a town of Virginia, in the Mattapony; four miles N.E. of West Point.

ROOTS, a township of Portage county, in the Ohio, containing 216 inhabitants.

ROOTWELT, in *Husbandry*, a term applied to the battocks of grain, when the butt-ends of the sheaves are turned up towards the wind and sun, in order to dry them. The practice is common in bad rainy harvests. See HARVEST, and HARVESTING Grain.

ROPALON, in *Botany*, a name given by some authors to the *nymphæa*, or water-lily, and also to the *faba Ægyptia* of the river Nile.

ROPE, an assemblage of several twists or strings of hemp, twisted together by means of a wheel; of various uses, as in binding, staving, drawing, suspending, &c.; or, all cordage, in general, above one inch in circumference, mostly made of hemp spun into yarns or threads of a certain length; and a number of these yarns or threads, according to the size of the rope, are twisted together, and called a strand. Three of these strands twisted or laid together, is called a hawser-laid rope, and nine of them a cable-laid rope. See ROPE-Making.

ROP

When the rope is made very thick, it is called a *cable*; and when very small, a *cord*.

Though it be difficult to give a certain account of the forces required to bend ropes of different diameters, in making them go round bodies of different bignesses, yet to make no allowance for the loss of motion sustained thereby, would be as prejudicial to the practice of mechanics, as it would be to overlook the friction of the parts of engines. The difficulty of ascertaining this force arises from the different materials of which they are made, their different stiffness according as they are more or less twisted; and sometimes from the temperature of the air, as to moisture and dryness.

Dr. Defaguliers has computed the forces required to bend ropes of different diameters, stretched by different weights, round rollers of different bignesses. The result of his experiment is expressed in the following table.

Diameters of the ropes of three strands, expressed in tenth parts of an inch.	Weights stretching the ropes, expressed in lb. avoirdupois.	Resistance about a roller of half an inch diameter, in oz. avoirdupois.	Resistance about a roller of one inch diameter, in oz. avoirdupois.	Resistance about a roller one and a half inch diameter, in oz. avoirdupois.
0.5	60	225	112½	75
0.2	60	90	45	30
0.1	60	45	22½	15
0.5	40	150	75	50
0.2	40	60	30	20
0.1	40	30	15	10
0.5	20	75	37½	25
0.2	20	30	15	10
0.1	20	15	7½	*

On the whole, it has been found by experiments, that the difficulty of bending a rope round a roller decreases directly as the diameter of the roller increases, or is, inversely, as the diameter of the roller. See Defaguliers, *Experim. Phil.* vol. i. p. 233, &c. See also **CORDAGE**.

A TABLE, shewing how many fathoms, feet, and inches of a rope of any size, under fourteen inches, makes a hundred weight, with the use of the table.

Inches.	Fathoms.	Feet.	Inches.	Fathoms.	Feet.	Inches.	Fathoms.	Feet.	Inches.	Fathoms.	Feet.	Inches.	Fathoms.	Feet.	Inches.
1	486	0 0	4	24	0 0	8	7	3 6	11	3	4 1	1	1	313	13 0 0
1	313	13 0 0	4	21	3 0	8	7	0 8	11	3	3 3	1	1	216	0 0 0
1	216	0 0 0	5	19	3 0	8	6	4 3	12	3	2 3	1	1	159	3 0 0
1	159	3 0 0	5	17	4 0	9	6	2 1	12	3	2 1	1	2	124	3 0 0
2	124	3 0 0	5	16	1 0	9	6	0 0	12	3	2 0	2	2	96	2 0 0
2	96	2 0 0	6	14	4 6	9	5	4 0	12	2	7 8	2	2	77	3 0 0
2	77	3 0 0	6	13	3 0	9	5	2 0	13	2	5 3	2	2	65	4 0 0
2	65	4 0 0	6	12	2 0	9	5	0 6	13	2	4 9	3	3	54	0 0 0
3	54	0 0 0	6	11	3 0	10	4	5 0	13	2	4 0	3	3	45	5 2 0
3	45	5 2 0	7	10	4 0	10	4	4 1	13	2	3 6	3	3	39	3 0 0
3	39	3 0 0	7	9	5 6	10	4	2 2	14	2	2 1	3	3	34	3 9 0
3	34	3 9 0	7	9	1 6	10	4	1 8				4	4	30	1 6 0
4	30	1 6 0	7	8	4 0	11	4	0 3				4	4	26	5 3 0
4	26	5 3 0	7	8	3 6	11	3	5 7							

ROP

Suppose I want to know how much of eight-inch and quarter rope will make a hundred weight? Find 8¼ under inches, and against it, in the sixth column, you find 7 0 8, which shews in a rope of 8¼, there will be seven fathoms eight inches required to make one hundred weight.

A TABLE, shewing the weight of any cable or rope of 120 fathoms in length, and for every half inch from three inches to twenty-four in circumference.

Inches.	Qrs.	Inches.	Qrs.	Inches.	Qrs.	Inches.	Qrs.	Inches.	Qrs.
3	2 1	7½	14 0	12	36 0	16½	68 0	21	110 1
3½	4 0	8	16 0	12½	39 0	17	72 1	21½	115 2
4	4 1	8½	18 0	13	42 1	17½	76 2	22	121 0
4½	5 0	9	20 1	13½	45 7	18	81 0	22½	126 2
5	5 1	9½	22 2	14	49 0	18½	85 2	23	132 1
5½	7 0	10	25 0	14½	52 2	19	90 1	23½	138 0
6	9 0	10½	27 2	15	56 1	19½	95 0	24	144 0
6½	10 2	11	30 1	15½	60 0	20	100 0		
7	10 1	11½	33 0	16	64 0	20½	105 0		

The greatest consumption of rope is used for the purposes of navigation in rigging of ships: where, though ropes include the whole cordage, there are several particularly denominated, and which have particular names given to them; as follow. 1. Awning-ropes are the ridge and side-ropes. The ridge-rope reeves through the trucks seized along the middle of the awning; the side-ropes reeve through the trucks seized along the side of the awning. By these ropes the awnings are spread between the masts. 2. Bell-rope, nine or ten feet in length, which splices round a thimble in the eye of the bell-crank. In the middle of the rope is a diamond-knot, and at the end a double wall-knot crowned. 3. Boat-rope, or painter, that by which the boat is towed at the stern; it splices with a thimble to a ring-bolt inside the stem. 4. Bolt-rope, the rope sewed to the edges of the sails, as the head-rope, foot-rope, and leech-rope. 5. Breast-rope, that fastened along the laniard of the shrouds, for safety, when heaving the lead in the chains. 6. Bucket-rope, that which is fastened to the bucket for hauling up water. 7. Buoy-rope, the one fastened to the buoy and crown of the anchor. 8. Davit-rope, the lashing which secures the davit to the shrouds when out of use. 9. Entering-ropes have their upper end thrust through the eye in the iron-stantions at the gangways, and are walled and crowned; and diamond-knots are made at every nine inches asunder in the whole length. 10. Grapple-rope, that which is bent to the grapple, by which the boats ride. 11. Guist-rope, that fastened to an eye-bolt in the ship's side, and to the outer end of a boom projecting from the ship's side, by guys, to keep the boats clear from rubbing against the sides. 12. Heel-rope, that which hauls out the bowsprit of cutters, and the jib and studding-sail boom. 13. Man-ropes are for the security of the men going out upon the bowsprit. 14. Parral-ropes are to connect the ribs and trucks of the parral together. 15. Passing-ropes lead round the ship through the eyes in the quarter wait and forecattle-stantions, have one end stopped through the eye of the gangway-stantion, with a wall-knot crowned, and are set forward through an eye-bolt in the knight-head with a laniard, having a thimble turned into the end. 16. Ring-ropes are occasionally made fast to the ring or stopper-bolts in the deck, and by crofs turns round the cable, to confine it more securely in stormy weather. 17. Slip-rope is to trice the bight of the cable into the heads;

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heads; a slip-rope is also used in casting off a vessel, till got into the tide's way, &c. 18. Swab-rope is made fast to the eye of the swab, to raise it out of the water. 19. Tiller-ropes are the ropes by which the tiller is worked by means of the steering-wheel. 20. Top-rope is the rope that is reeved through the sheave-hole in the heel of the topmast, to raise it by its tackle to the mast-head. 21. Yard-ropes are only temporarily used to heave the yards on board.

Ropes are distinguished by being either *cable-laid* or *hawser-laid*: the former are composed of nine strands, *viz.* three great strands, each of which is composed of three smaller strands, and each containing an equal number of threads: and a rope, cable-laid, eight inches in circumference, has 333 threads, equally divided, and laid into nine strands: the latter is made with three strands, each of which contains a certain number of rope-yarns, in proportion to the size of the rope required. A rope hawser-laid, eight inches in circumference, has 414 threads, equally divided, and laid into three strands. Thirty fathoms of yarn make eighteen fathoms of rope cable-laid, and so in proportion. Thirty fathoms of yarn make twenty fathoms of rope hawser-laid, and so in proportion. Ropes of from one to two and a half inches in circumference are hawser-laid; of three inches to ten inches, either hawser-laid or cable-laid; and from ten inches to any greater dimension, always cable-laid.

Twice-laid cordage is made of coil rigging, as shrouds, stays, mooring and other cables, which, if not much worn, will make good ropes for netting ships' sides, worming and wooding for cables, spun-yarn for seizing, worming for large stays, seizing for stops of blocks, small cable-laid ropes for warping ships, ratlines, scaffolding-ropes for dock yards, &c.

When the yarn of this old stuff is overhauled, a little thin tar should be poured on it, which will make it pliable and lie better. The yarn unfit for knotting will pick into oakum for caulking.

To open a cable, for making it into small ropes, hang the strands upon three hooks in the tackle-board, stretch it out tight upon the hooks in the sledge, and heave till they are untwisted; then draw out the yarn.

The process of making small ropes is similar to making large ones, except the twisting and closing, which are done by a back-frame wheel or a table-wheel. See the next article.

ROPE-Making, the art of preparing hemp, and spinning it into yarns or threads, and twisting those threads into strands, and laying those strands into cordage of the largest size, as the smallest kind is called *cord* or *twine* spinning.

Before we proceed further, it may be necessary to inform our readers of the different sorts of hemp proper to be made use of in the manufacturing of cordage. Of all the hems yet produced at our English markets, the Russian hemp has proved to be the best; it is grown in the southernmost parts of Russia, and shipped for England from the ports of St. Petersburg and Riga. The best sort is Riga rhine hemp: the next in quality is termed Petersburg clean hemp. These two are considered the best sorts of hemp to be used in making the strongest cordage.

The first process in the art of rope-making is, *Hatchelling the Hemp*.

Hatchelling the hemp, is the combing or clearing the ends, which else, in spinning, would run in with the long hemp, and so preparing it ready for the spinner; in the process of which, care and particular attention must be paid by the hatchellers that they do not use too great a quantity of oil, as in such case it will prevent the yarn from imbibing

its proper proportion of tar, and thereby prove a serious injury.

N. B. A small quantity of train-oil, say one pint to every hundred weight, sprinkled or daubed with a wad on the hemp, facilitates the hatcheller's business exceedingly, and is very necessary when the hemp is somewhat too dry, as the spinners are better able to perform their business when it has received such assistance.

The second and principal process to be attended to in the manufacturing of cordage, is *Spinning the Yarn*.

In spinning, particular attention must be paid by the spinner that the yarn be spun even, solid, and round; to accomplish which, he must spin with a strong even grip of the hand, taking care not to make his yarn larger in one place than in another, nor make a practice of spinning too much in a hurry; and the spinning-wheel must be kept turning a constant regular pace, otherwise the yarn so spun will lose its principal support, which is its proper turn, or twist, and will be little stronger than a parcel of straight hemp laid together, which would break in warping or straining up. The following regulations must be attended to in spinning. Every spinner is to spin out of the best hemp six threads, one hundred and sixty fathoms long, for a quarter of a day's work; but he is to spin out of the hemp which compose the bands by which the bales of hemp are bound together, no more than four threads, one hundred and sixty fathoms long, for one quarter of a day's work. To every twelve spinners there are allowed two hatchellers, one wheel-turner, and one wheel-tender: the wheel-tender's business is to splice the threads, and wind them on winches. The latter mentioned persons are paid in the same proportions as the spinners, that is, according to what work is done upon the wheel, only with this difference, the spinners are paid seven-pence *per* quarter for their work, the hatchellers, wheel-turner, and wheel-tender, only sixpence.

Each thread of the under-mentioned sizes of yarn to the spinning mark, (*viz.* 160 fathoms,) should weigh as follows:

	lbs.	oz.	drs.		lbs.	oz.	drs.
16	4	0	0	21	3	0	4
17	3	12	4	22	2	14	9
18	3	8	14	23	2	12	8
19	3	5	14	24	2	10	10
20	3	3	3	25	2	8	15

The third process to be attended to in the manufacturing of cordage, is *Warping the Yarn*.

Warping the yarn, is the stretching the yarns, previously to their being tarred, all to one given length, which, in full length rope grounds, is two hundred fathoms, and putting a slight turn or twist into it. The usual method is to warp the yarn either in whole or half hawls, which is done by putting the number of threads you mean to draw down at once in a bite, into a block with one sheave, (the one end of the bite of yarn being fast at the upper end,) which being drawn down and fixed over the end of a hook made fast to a post at one hundred fathoms distance from the warping post, forms, when opened, a length of two hundred fathoms, as above-mentioned. The number of half bites, or blocks of yarn, contained in a whole or half hawl, is to be governed, in a great measure, by the size of the yarn to be warped,—as, for instance, 16 to 19-thread yarn is warped three hundred and thirty-six threads in a hawl, 20 to 25-thread yarn is warped four hundred threads in a hawl. In winding the yarns on the winches after they are spun, it is most usual to wind them on in companies of four in a company; but as that method can-

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not always be pursued, it frequently happens that whole or half hawls of yarn are obliged to be warped in half bites of an odd number.

The following rules and regulations respecting the warping of yarn must be particularly attended to.

In a hawl of yarn containing three hundred and thirty-six threads, there should be warped as under-mentioned.

¾ Bites.	Threads.	of	9 threads in a ½ bite.
37	3	of	9 threads in a ½ bite.
33	6		10 ditto.
30	6		11 ditto.
28	0		12 ditto.
25	11		13 ditto.
24	0		14 ditto.
22	6		15 ditto.
21	0		16 ditto.
19	13		17 ditto.
18	12		18 ditto.
17	13		19 ditto.
16	16		20 ditto.

In a hawl of yarn containing four hundred threads, there should be warped as under-mentioned.

¾ Bites.	Threads.	of	9 threads in a ½ bite.
44	4	of	9 threads in a ½ bite.
40	0		10 ditto.
36	4		11 ditto.
33	9		12 ditto.
30	11		13 ditto.
28	8		14 ditto.
26	10		15 ditto.
25	0		16 ditto.
23	9		17 ditto.
22	4		18 ditto.
21	1		19 ditto.
20	0		20 ditto.

When the yarn is warped in half hawls, it is to be carefully observed that only half the number of yarns, or threads, above-mentioned, are to be warped, and care should be taken to warp the number of threads as near as possible.

It requires three men to warp a hawl of yarn, who are employed as follows: *viz.* two men to warp (or draw the yarns to their proper distance), and one man to set up (that is, to tighten the yarns, and bring each yarn to its proper bearing): each man is allowed twelve threads (or two quarters of a day's work) for his labour.

To take the hawl of yarn up after it is warped, and carry the same into the tar-house, requires ten men, who are each paid one thread (*viz.* one penny) for their labour.

The fourth process to be attended to in the manufacturing of cordage, is *Tarring the Yarn.*

Tarring the yarn is a process which should be particularly attended to, being extremely careful that the tar is not boiling too fast nor too slow; if too fast, the tar will not stay in the yarn, if not hot enough, the tar will not sufficiently penetrate the yarn; therefore a strict medium must be carefully observed by the kettle-heater, as well as to keep the horse, or men, which turn the capstan round, going at a gentle, steady pace, thereby giving the yarn a proper time to imbibe its necessary proportion of tar, but at the same time not suffering it to be kept in the boiling tar too long, which is apt to make the yarn very tender, therefore should be very carefully avoided; and should the capstan be stopped by accident, the stop that keeps the yarn down must be instantly raised, and the yarn taken out. Particular attention

should also be paid in paying (or coiling) the yarn into the kettle, that too long a length be not payed in at once; if it is so done, the yarn will, of course, touch the bottom of the kettle, which it should, by no means, be suffered to do, as in such case it will imbibe the dregs and settlements of the tar appertaining to the bottom of the kettle, and make the yarn in such places black, or very much discoloured, and have a very unpleasing appearance in the rope when made. Yarn for cables requires more tar than for hawser-laid ropes. For standing and running rigging the less tar the better, provided the thread is well covered. It should be always remembered that the yarn, when tarred, should be overfset (or removed) the same day, as this piece of business, being omitted, will be likely to prove of a serious consequence in heating and tendering the yarn, which at all times must be carefully avoided. In overfsetting the yarn it should always be remembered that the yarn be well shook and opened for two or three days, as in so doing it admits the air, separates and hardens the yarns, and contributes very much to the strength of the cordage. The hawls or half hawls of yarn, when tarred, should always be weighed and tallied.

Tarring yarn requires three men, who are employed as follows: *viz.* one to heat the kettle, one to pay (or coil) the yarn in the kettle, and one to haul off and overfset the yarn. They are, in general, paid in proportion to the work the spinners perform, which is called going by the wheel.

The fifth and last process to be attended to, is *Laying the Cordage.*

In laying cables, and all sorts of ropes in general, the great art lies in making each yarn to bear alike. For this purpose it was, particularly in the larger sized cables, that the patent machines have been introduced. Particular attention must be paid to this point, as therein consists the grand principle of making a strong rope. For all sorts of ropes which are to be immersed in the water, the utmost care must be taken to give the strands their proper hardness in their first process, according to the remarks laid down before, which will prevent the water from penetrating the strands, and thereby preserve the inside yarns of the cable; as, if this process is not regularly attended to, the inside yarns will be always wet, and very soon decay. It frequently happens that when the yarn is tarred somewhat too deep, that many a cable is spoiled, though not intentionally; the fear in the person who has the direction in making the cable, of turning a very dark coloured rope out of hand, prevents the regular make being given the cordage, as in pressing the yarn to their proper hardness, the tar will spring out, very much discolour the rope, and thereby give it a very unpleasing appearance, especially when the sun is shining very hot upon the yarn; to prevent which, in a great measure, care should be taken, in the summer months, to lay cables, and all sorts of cordage in general, either early in the morning, before the sun has much power on the yarn, which is also apt to tender it, or late in the evening, after the sun has set, or gone off the ground, or in heavy weather (by no means rainy); in which case your cordage will have a bright pleasing appearance, as the small fibres of the hemp will all yield to the top, and lay smooth, which otherwise would look rough, and appear as if the cordage was made of inferior hemp, though in fact it was not so, as all sorts of hemp have small fibres appertaining to them, and which it is past the art of man to prevent the sun from drawing up, and thereby making the rope look rough and unseemly.

N. B. The above remarks respecting taking advantage of the time for laying the cordage are only to be observed in uncovered grounds.

ROPE-MAKING.

In *laying cordage*, the yarn for twisting into strands is hung on the hooks in the tackle-board, at the upper end of the ground, and upon hooks in the breast-board of the sledge, at the lower end, which are turned by men at both ends until the strands are hard; and are kept up from the ground by the stake-heads.

Before the turn is put in, the yarn should be stretched to its full extent by means of the tackle fixed from the sledge to the capstern, at twenty yards asunder, at the lower end of the ground; and when stretched to two hundred fathoms, the press is put upon the sledge and drag, before the tackle-fall is cast off; for if the yarn be not properly stretched before the tackle-fall is cast off, the rope will not be of its size, nor well made.

The strands should have a good hardening before the top is put in to lay the rope, and the layer should see that the heavers at the upper end keep the same hardness that the strands had before the top set off, nor should he begin to lay the rope until the sledge or wheel is moved by the power of the twist from the upper end.

When twisted sufficiently hard, the strands are hung on one hook in the breast-board of the sledge, but remain separate on the three hooks at the other end. The top is placed in at the sledge, and the rope twisted by turning the hooks at both ends one way, and, as the rope closes, the top moves towards the upper end.

When the top is put in, some of the weight should be taken off the sledge or drag, for if laid with as much weight as is used in the hardening, it would be too stiff, but, by removing a part of the weight, the strands will couch better.

The strength of the men at the hooks being greatly inadequate to the force required for twisting of cables, woolders are used, according to the size of the cable, at equal distances along the whole length.

Cables should be rounded by the lower hook after they are laid, to throw the turn well up. They are generally thought to wear best when slack-laid; but some think when short-laid.

Cablets used for tow-lines or hawfers, require the strands to be laid shorter than cable-strands, but not so short-laid in closing; for being used in water, they would become stiff, hard, unhandy to coil away, and liable to break in cold weather.

In all cable-laid ropes, the proportion of the circumference is to the length of the strand in one round, as 11 is to 15; that is, if the circumference be $14\frac{1}{2}$ inches, the length of the strand in one circumference is $19\frac{1}{2}$ inches. In all hawfer-laid rope, the proportion is as 12 to 16; that is, if the circumference be 7 inches, the length of the strand in one circumference is near $9\frac{1}{2}$.

The strength of ropes depends on the hardening or well manufacturing, and not on the bare strength of the hemp; for it strengthens through every stage; *viz.* when first spun into yarn it is little better than hemp extended; when

twisted into strands, it shortens and strengthens as above, and increases in the same manner when laid into rope.

Where the diameter and circumference of one rope to another is as two to one, that is, where one rope is twice as big as another, the square of the diameter is as four to one; which shews, that one rope has four times as much yarn in it as the other, and consequently is four times as strong, according to the different magnitudes.

Cable-laid ropes shorten as five to three, and hawfer-laid ropes as three to two; consequently the length of the yarn and strength will be accordingly; that is, the strength will be in the yarn, after it is laid in the rope, as much as if the rope-maker, in spinning, had allowed the same quantity of hemp in two feet as he did in three feet, so that the strength communicated by the process is two-thirds.

A rope is the same size when laid as the yarns were before twisted; so that what the yarns are lessened by twisting it is made up by shortening; from which it is inferred, that the yarns are always of an equal bigness, since the hemp is the same at one time as at another, and not any way diminished.

Were the strands single, without being twisted one about another, the strength would then be only in proportion as the area of each particular strand is in itself; but if the strands could possibly be twisted so as to be directly perpendicular to the base, the strength would then be found, by multiplying the diameter of the strands and the diameter of the whole rope one into the other, and the half of the product would be the strength of the said strands; but more particularly take the area of the single strand and area of the whole cable, and add them together, and the half of that will shew the strength of each strand when they are well twisted together.

But as it may be observed the strands lie at a certain angle between a perpendicular and the base, so that, as the angle of incidence is to radius, so is the relative to the absolute strength.

Respecting the *Banding of Cordage*.—In the calculations specifying the weights of the different lengths of cordage, such weights are to be considered as the neat weights of the rope without bandage.

N. B. To every hundred weight of cordage the manufacturer is allowed to put on four pounds weight of bands; those bands are composed of the shakings, flyings, and strings with which the hemp is tied together, formed into an inferior kind of cordage; but it is to be observed those are all weighed to the rope-makers as good hemp, and paid for accordingly, therefore if he was not allowed to apply the refuse to such purpose, he must either put a higher price on his cordage, or be a very considerable loser. At the same time it should be considered, that as it is necessary that every coil of rope should be bound together for the convenience of carriage, stowage, &c. this kind of bandage answers such purpose in every degree, as well as if the coils were bound with bands made from the best hemp.

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TABLE I.

These sizes of Yarn are warped 336 Threads, and from 19 are warped 400 Threads in a Hawl.

		16	17	18	19	20	21	22	23	24	25
A	Weight of one thread 200 fathoms long.	lb. oz. dr.									
		5 0 0	4 11 5	4 7 2	4 3 6	4 0 0	3 12 5	3 10 3	3 7 10	3 5 5	3 3 3
B	One-tarred thread 200 fathoms long should weigh from	6 3 0	5 13 3	5 8 0	5 3 6	4 15 3	4 11 5	4 8 0	4 4 14	4 2 0	3 15 6
		to									
C	Ten fathoms of each size of B should weigh from	6 4 0	5 14 2	5 8 14	5 4 3	5 0 0	4 12 3	4 8 11	4 5 9	4 2 10	4 0 0
		to									
D	Weight of each hawl before tarred.	C. qr. lb.									
		15 0 0	14 0 13	13 1 9	12 2 14	14 0 4	13 2 11	12 3 13	12 1 19	11 3 17	11 1 20
E	Weight of each hawl when tarred from	18 2 7	17 1 25	16 2 0	15 2 15	17 2 20	16 3 9	15 3 19	15 1 14	14 2 25	14 0 16
		to									
		18 3 0	17 2 16	16 2 18	15 3 4	17 3 12	17 0 0	16 0 9	15 2 3	14 3 14	14 1 4

N. B. The calculations of B and C will be found extremely useful, provided the yarn be spun and tarred regular, as by weighing one single yarn, or even ten fathoms, the size of the yarn may be ascertained, without being at the trouble of weighing the hawls.

TABLE II.

Shewing the Number of Threads to work *per* Hook for three-strand cable-laid Cordage of 6, 12, 18, and 24 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Girt of each Strand, and Weight of each Cable: also the Number of Men required to lay both Strands and Cable, with the Allowance to each Man for his Labour.

The N ^o of Threads here mentioned weigh 99 lb. to 100 lb.		Sizes of Yarn										Weight of each Cable 120 Fathoms long.	Men for Strands.	Threads <i>per</i> Strand.	Men for Cables.	Threads <i>per</i> Cable.	
		16	17	18	19	20	21	22	23	24	25						
Sizes in Inches.	Girt of Strands.	Threads <i>per</i> Hook.															
												C. qr. lb.					
6	3 $\frac{1}{2}$	18	19	20	21	22	23	24	25	27	28	9 0 0	7	6	15	6	
12	6 $\frac{1}{2}$ $\frac{6}{8}$	72	76	80	85	89	94	98	103	107	112	36 0 0	17	6	37	8	
18	9 $\frac{1}{2}$ $\frac{1}{2}$	162	171	181	191	201	211	221	231	242	252	81 0 0	31	8	73	12	
24	12 $\frac{1}{2}$ $\frac{1}{8}$	288	304	322	340	358	376	394	412	430	448	144 0 0	42	*10	108	18	

* Six threads are called a quarter of a day's work, for which each workman is paid 7*d.*, and so on in proportion for a greater or less number.

Remarks and Directions how to apply Tables I. and II.

Example.—Suppose a cable of 12 inches in circumference is wanted to be made, the hawls of yarn out of which, upon examining the weights, are found to weigh 16 cwt. 2 qr. 10 lb. *per* hawl of 336 threads. A reference is to be made to Table I. line E, and the weight, being between 16 cwt. 2 qr. 0 lb. and 16 cwt. 2 qr. 18 lb. will be found to answer to 18-thread yarn. Then look down the 18-thread column, Table II., and upon the line of 12, (the size in the margin,) is found 80 threads *per* hook, which is the number of threads to be laid up *per* hook for the cable to be made of the weight *per* hawl of yarn of 336 threads above specified.

Again, if the hawls of yarn should be tarred of such a weight (say for example) requires to be worked between a

17 and an 18-thread yarn, in such case take the number of threads *per* hook to be worked for the size of the cable demanded, as should be worked both for 17 and 18-thread yarn; add them together, and take half the number of threads so added, to work *per* hook for the cable; but if there should happen in dividing to be an odd thread remaining, you must observe to which side the weight of your hawl of yarn is most inclining, and throw the thread in dispute to the heaviest side. The same rules must be observed in consulting all the following tables.

Remarks.—In laying three-strand cable-laid cordage, if you are in doubt respecting the size of your yarn, you must girt the yarn you purpose laying in one strand, and that should be half the size of your cable.

In hardening the strands in the laying of cable-laid cordage,

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cordage, you must work with (in addition to your sledge) one prefs-barrel to every 20 threads contained in your strand; but in laying the strand, hardening, and laying the cable, you must have only one prefs-barrel to every 40 threads contained in your strand or cable. The above is to be considered as a standing rule in covered rope-grounds, but in open grounds, the prefs must be varied according to the state of

the bottom of the ground, which, after a shower of rain, or in damp weather, will be naturally soft, and occasion the sledge to draw exceedingly heavy, and of course want the less weight of prefs.

N. B. The weight of a prefs-barrel should be from $3\frac{1}{2}$ to 4 cwt.

TABLE III.

Shewing the different shrinking Proportions of the Yarns and Strands in each Process in making the undermentioned Lengths of Cable.

	Length in fathoms of cable.	Length of yarns required to be warped.	In hardening the strands, the yarn will shrink 1-5th part of the whole length warped, and is called the strand's hardening mark.	In laying the strands, the strand will shrink 1-10th part of the whole length warped, and is called the strand's going distance.	In hardening the cable-strands previous to laying the cable, the strands will shrink 1-30th part of the whole length warped, and is called the cable's hardening mark.	In laying the cable it will shrink 1-15th part of the whole length warped, which brings it to the length required.			
The Sledge should move up to the following Distances from the Tackle-Posts.									
	fms.	fms.	ft.	fms.	ft.	fms.	ft.	in.	fms.
$\frac{1}{2}$ Cable	40	66	4	53	2	46	4		40
$\frac{3}{4}$	60	100	0	80	0	70	0		60
$\frac{1}{2}$	80	133	2	106	4	93	2		80
Whole	120	200	0	160	0	140	0		120

TABLE IV.

Shewing the Weights of three-strand cable-laid Cordage.

	fms.	3-Inch Cable.	6-Inch Cable.	9-Inch Cable.	12-Inch Cable.	15-Inch Cable.	18-Inch Cable.	21-Inch Cable.	24-Inch Cable.
		C. qr. lb. oz.							
$\frac{1}{2}$ Cable	40	0 3 0 0	3 0 0 0	6 3 0 0	12 0 0 0	18 3 0 0	27 0 0 0	36 3 0 0	48 0 0 0
$\frac{3}{4}$	60	1 0 14 0	4 2 0 0	10 0 14 0	18 0 0 0	28 0 14 0	40 2 0 0	55 0 4 0	72 0 0 0
$\frac{1}{2}$	80	1 2 0 0	6 0 0 0	13 2 0 0	24 0 0 0	37 2 0 0	54 0 0 0	73 2 0 0	96 0 0 0
Whole	120	2 1 0 0	9 0 0 0	20 1 0 0	36 0 0 0	56 1 0 0	81 0 0 0	110 1 0 0	144 0 0 0

It is necessary to be understood, that in rope-making (according to the nature of the rope), weight will give size, and size will give weight, if properly made.

Rule.—To calculate very nearly the weight of any sized rope from 3 to 24 inches in circumference, 120 fathoms long, and lesser lengths in proportion; as may be readily proved by the above table, viz. multiply the size of the rope by itself, and one-fourth of that product is the weight of a hundred of 112 pounds.

Example.—Suppose the rope 12 inches in circumference; $12 \times 12 :: 144$, the fourth of which is 36 hundred weight, or 3732 pounds, the weight of 120 fathoms of rope 12 inches in circumference. Again, 40 fathoms is the third of 120 fathoms; and the third of 36 cwt. is 12 cwt. the weight of 40 fathoms of 12-inch cable, as above.

Directions how to apply the following Tables.

In which is considered the four most principal sorts of yarns made use of in cable-laid cordage, viz. 16, 18, 20, and 25-thread yarn, and in hawser-laid cordage, to the three principal sorts of yarn made use of, viz. 18, 20, and 25-thread yarn, as it is very seldom any other size yarn is made for either cable or hawser-laid rope, except very particularly ordered to the contrary. The particulars of every rope of the sizes mentioned in the tables are fully explained

to the length of twenty fathoms, which will be found quite a sufficient guide for a rope of any length required:

As for Example.—Suppose I want a taper cable-laid rope to be made out of 16-thread yarn, 60 fathoms long, and 6 inches in circumference, to be tapered $\frac{3}{4}$ ds the length, and $\frac{3}{4}$ ds the size of the rope. I refer to Table V., and find under the figure 6, (the size demanded,) that it must be worked 5 threads *per* hook in the shank, the length of yarn to be warped for which, for 20 fathoms (I find in the margin) requires to be 33 fathoms 2 feet, three times which is 100 fathoms, the length of yarn required to be warped for the shank of a rope of 60 fathoms long. I then observe, in the next column on the right in the margin, the length of yarn required in the head for 20 fathoms is 11 fathoms 0 feet 8 inches, three times which is 33 fathoms 2 feet, the length of yarn required in the head to the first taper for a rope of 60 fathoms. Next refer to the number of tapers to be worked, which, upon looking under the figure 6, (the size demanded,) I find to be 9, the distance between them I find (upon casting my eye down the column) to be 14 feet $7\frac{1}{2}$ inches for 20 fathoms, three times which is 44 feet $5\frac{1}{2}$ inches, the distance to be observed between the tapers for a rope of 60 fathoms, being the length demanded. The same rule is to be observed, either adding or multiplying, according as required in all the tables of a similar description.

TABLE

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TABLE V.

Showing the Number of Threads to work *per* Hook, both in the Shank and Tapers, in making three-strand taper cable-laid Cordage of the following Sizes, and the Lengths thereto prefixed, with the Lengths of Yarn required to be warped for the fame, and the Distance to be observed between the Tapers; for 16, 18, 20, and 25-thread Yarn.

To Taper two-thirds the Length, and two-thirds the Size of the Rope

Fathoms demanded.	Lengths of Yarn in the Shank or whole Parts.	Lengths of Yarn in the Head to the first Taper.	Lengths of Yarn to Taper.	Thread Yarn.	Inches.	To Taper two-thirds the Length, and two-thirds the Size of the Rope																											
						5	4½	4	5	6	6½	7	7½	8	8½	9	9½	10															
5	8 2	2 4 8	5 3 4	16	3½	21	18	15	12	10	8	28	32	36	40	45	50	55	60	62	70	78	17	19	22	26	33	36	40	46	52		
10	16 4	5 3 4	11 0 8	18	7	23	20	16	14	12	10	31	36	40	45	50	55	60	62	70	78	17	19	22	26	33	36	40	46	52			
15	25 0	8 2 0	16 4 0	20	8	26	22	18	15	13	11	34	40	45	50	56	62	68	74	80	88	12	14	15	17	21	24	26	30	33	37	42	
20	33 2	11 0 8	22 1 4	25	10	33	28	23	19	17	15	43	50	56	63	70	78	86	94	102	110	12	14	15	17	21	24	26	30	33	37	42	
5	8 2	2 4 8	5 3 4	16	2	7	6	5	4	4	4	8	11	12	14	15	17	19	22	26	33	37	42	48	54	60	66	72	78	84	90	96	102
10	16 4	5 3 4	11 0 8	18	3	8	7	6	5	5	5	9	12	14	15	17	19	22	26	33	37	42	48	54	60	66	72	78	84	90	96	102	108
15	25 0	8 2 0	16 4 0	20	3	9	8	7	6	6	6	10	14	15	17	19	22	26	33	37	42	48	54	60	66	72	78	84	90	96	102	108	114
20	33 2	11 0 8	22 1 4	25	4	10	9	8	7	7	7	11	14	15	17	19	22	26	33	37	42	48	54	60	66	72	78	84	90	96	102	108	114
5	8 2	2 4 8	5 3 4	16	4	12	10	9	8	8	8	18	21	24	26	30	33	37	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
10	16 4	5 3 4	11 0 8	18	4	13	12	10	9	9	9	20	24	26	30	33	37	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132
15	25 0	8 2 0	16 4 0	20	5	14	14	12	10	10	10	22	26	30	33	37	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138
20	33 2	11 0 8	22 1 4	25	6	18	18	15	12	12	12	28	33	37	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150

Distances between the Tapers.	
ft. in.	ft. in.
8 4	16 8
13 4	25 0
20 0	33 4
26 8	42 0
33 4	50 8
40 0	59 2
46 8	68 0
53 6	76 8
60 4	85 6
67 2	94 4
74 0	103 2
80 8	112 0
87 6	120 8
94 4	129 6
101 2	138 4
108 0	147 2
114 8	156 0
121 6	164 8
128 4	173 6
135 2	182 4
142 0	191 2
148 8	200 0
155 6	208 8
162 4	217 6
169 2	226 4
176 0	235 2

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TABLE V.—continued.

To Taper half the Length and half the Size of the Rope.

Fathoms demanded.	Lengths of Yarn in the Shank or whole Parts.	Lengths of Yarn in the Head to the first Taper.	Lengths of Yarn to Yarn to Taper.	Distance between the Tapers.																
				Thread Yarn.	Inches.	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10		
Sizes demanded Threads per hook at the head	-	-	-	16	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10		
	-	-	-	18	6	5	10	12	15	18	21	24	28	32	36	40	45	50		
	-	-	-	20	4	4	9	11	14	18	23	27	31	36	40	45	50	55		
	-	-	-	25	5	6	12	15	19	23	28	33	38	43	50	56	63	70	78	
Number of threads to be worked in the shank	-	-	-	16	3	4	5	6	8	9	11	12	14	16	18	20	23	25		
	-	-	-	18	4	5	6	7	8	10	12	14	16	18	20	23	25	28		
	-	-	-	20	4	4	8	9	10	11	13	15	17	20	23	25	28	32		
	-	-	-	25	5	6	8	10	12	14	17	19	22	25	28	31	35	39		
Number of threads to be worked in the tapers	-	-	-	16	3	4	5	6	7	9	10	12	14	16	18	20	22	25		
	-	-	-	18	3	4	5	7	8	10	11	13	15	18	20	22	25	27		
	-	-	-	20	4	4	6	7	9	11	13	15	17	20	22	25	28	30		
	-	-	-	25	5	6	8	9	11	14	16	19	21	25	28	32	35	39		
Fathoms demanded.	5	8 2	25	25	8 4	6 3	5 0	4 2	3 6 7/8	2 9 1/4	2 6	2 1	1 9 1/4	1 6 1/4	1 4 3/4	1 3	1 1 1/4	1 0		
	10	16 4	50	50	16 8	12 6	10 0	8 4	6 3 1/4	5 6 3/4	4 6 3/4	4 2	3 6 3/4	3 1 1/4	2 9 1/4	2 6	2 3 1/4	2 0		
	15	25 0	75	75	25 0	18 9	15 0	10 8 1/4	10 8 1/4	8 4	6 9 1/4	5 0	4 4 1/4	3 9	3 4 1/4	3 0	2 8 1/4	2 6		
	20	33 2	100	100	33 4	25 0	20 0	14 3 1/4	14 3 1/4	11 1 1/4	9 1 1/4	8 8	5 10 1/4	5 6 1/4	4 6 1/4	4 0	3 6 1/4	3 4		
	5	8 2	25	25	8 4	6 3	5 0	4 2	3 6 7/8	2 9 1/4	2 6	2 1 1 1/4	1 8	1 5 1/4	1 3 1/4	1 1 1/4	1 0	9 1/4	8 1/4	
	10	16 4	50	50	16 8	12 6	10 0	8 4	6 3 1/4	5 6 3/4	4 6 3/4	4 2	3 6 3/4	3 1 1/4	2 9 1/4	2 6	2 3 1/4	2 0	1 10 3/4	
	15	25 0	75	75	25 0	18 9	15 0	10 8 1/4	10 8 1/4	8 4	6 9 1/4	5 0	4 4 1/4	3 9	3 4 1/4	3 0	2 8 1/4	2 6	2 9 1/4	
	20	33 2	100	100	33 4	25 0	20 0	14 3 1/4	14 3 1/4	11 1 1/4	9 1 1/4	8 8	5 10 1/4	5 6 1/4	4 6 1/4	4 0	3 6 1/4	3 4	3 8 1/4	
	5	8 2	25	25	8 4	6 3	5 0	4 2	3 6 7/8	2 9 1/4	2 6	2 1 1 1/4	1 8	1 5 1/4	1 3 1/4	1 1 1/4	1 0	9 1/4	8 1/4	7 1/4
	10	16 4	50	50	16 8	12 6	10 0	8 4	6 3 1/4	5 6 3/4	4 6 3/4	4 2	3 6 3/4	3 1 1/4	2 9 1/4	2 6	2 3 1/4	2 0	1 8	
	15	25 0	75	75	25 0	18 9	15 0	10 8 1/4	10 8 1/4	8 4	6 9 1/4	5 0	4 4 1/4	3 9	3 4 1/4	3 0	2 8 1/4	2 6	2 8 1/4	
	20	33 2	100	100	33 4	25 0	20 0	14 3 1/4	14 3 1/4	11 1 1/4	9 1 1/4	8 8	5 10 1/4	5 6 1/4	4 6 1/4	4 0	3 6 1/4	3 4	3 6 1/4	3 4
5	8 2	25	25	8 4	6 3	5 0	4 2	3 6 7/8	2 9 1/4	2 6	2 1 1 1/4	1 8	1 5 1/4	1 3 1/4	1 1 1/4	1 0	9 1/4	8 1/4	7 1/4	
10	16 4	50	50	16 8	12 6	10 0	8 4	6 3 1/4	5 6 3/4	4 6 3/4	4 2	3 6 3/4	3 1 1/4	2 9 1/4	2 6	2 3 1/4	2 0	1 8	1 7 1/4	
15	25 0	75	75	25 0	18 9	15 0	10 8 1/4	10 8 1/4	8 4	6 9 1/4	5 0	4 4 1/4	3 9	3 4 1/4	3 0	2 8 1/4	2 6	2 8 1/4	2 7 1/4	
20	33 2	100	100	33 4	25 0	20 0	14 3 1/4	14 3 1/4	11 1 1/4	9 1 1/4	8 8	5 10 1/4	5 6 1/4	4 6 1/4	4 0	3 6 1/4	3 4	3 6 1/4	3 5 1/4	

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TABLE VI.

Shewing the Number of Threads to work *per* Hook and Heart for cable-laid Stays, four Strands and a Heart, of 5, 10, 15, and 19 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Girt of each Strand prefixed against each Size.

Number of Threads of under to weigh from 99 to 100lb.		16	17	18	19	20	21	22	23	24	25
Size in Inches.	Girt of each Strand.	Threads <i>per</i> Hook and Heart.									
5	2 $\frac{8}{9}$	9	9	10	11	11	12	12	13	13	14
10	4 $\frac{1}{4}$ $\frac{7}{9}$	35	37	39	41	43	46	48	50	52	55
15	6 $\frac{1}{2}$ $\frac{6}{9}$	79	84	89	94	99	104	109	114	119	124
19	8 $\frac{1}{2}$ $\frac{7}{9}$	127	135	143	151	159	167	175	183	191	199

The shrinking proportions of cable-laid stays are exactly the same as in three-strand cable-laid cordage, except in the clofing the stay, which being composed of four strands, lie much clofer in the rope than three strands, and having the heart of the stay to encompass, occasions the strands to shorten in a much greater proportion than in three-strand cable-laid cordage. The stay, in clofing, will shorten $\frac{2}{7}$ parts of the length of yarn first warped.

TABLE VII.

Shewing the Weight of cable-laid Stays, four Strands and a Heart, from 5 to 19 Inches in Circumference, and from 5 to 30 Fathoms in Length.

Fathoms in Length.	5-Inch Stay.	7-Inch Stay.	9-Inch Stay.	11-Inch Stay.	13-Inch Stay.	15-Inch Stay.	17-Inch Stay.	19-Inch Stay.
	C. qr. lb. oz.							
5	0 1 3 9	0 2 4 5	0 3 16 10	1 1 9 11	1 3 17 2	2 2 2 3	3 0 25 9	4 0 7 10
10	0 2 7 2	1 0 8 10	1 3 5 4	2 2 19 6	3 3 6 4	5 0 4 6	6 1 23 2	8 0 15 4
15	0 3 10 11	1 2 12 15	2 2 21 14	4 0 1 1	5 2 23 6	7 2 6 9	9 2 20 11	12 0 22 14
20	1 0 14 4	2 0 17 4	3 2 10 8	5 1 10 12	7 2 12 8	10 0 8 12	12 3 18 4	16 1 2 8
25	1 1 17 13	2 2 21 9	4 1 27 2	6 2 20 7	9 2 1 10	12 2 10 15	16 0 15 13	20 1 10 2
30	1 2 21 6	3 0 25 14	5 1 15 12	8 0 2 2	11 1 18 12	15 0 13 2	19 1 13 6	24 1 17 12

TABLE VIII.

Shewing the Number of Threads to work *per* Hook for four-strand cable-laid Cordage without a Heart, from 5 to 24 Inches in Circumference, of the Sizes of Yarn undermentioned, with the Weight of each Cable prefixed.

No. of Threads weighing from 99 to 100lb.	16	17	18	19	20	21	22	23	24	25	Weight of each Cable 120 Fathoms long.
Size in Inches.	Threads <i>per</i> Hook.										C. qr. lb.
5	9	10	10	11	12	12	13	13	14	15	6 2 10
10	38	40	42	45	47	50	52	54	57	59	25 3 6
15	85	91	96	101	107	112	118	123	128	134	58 3 0
20	152	162	171	181	190	200	209	219	228	238	104 1 9
24	219	233	247	260	274	288	301	315	329	343	150 1 2

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TABLE IX.

Shewing the Length of Yarn required to be warped, and the different shrinking Proportions in making the undermentioned Lengths of four-strand cable-laid Cordage.

Fathoms demanded.	Lengths of Yarn warped.	Strand's Hardening Mark.	Strand's Going Distance.	Cable's Hardening Mark.	Cable's Length.
	fms. ft. in.	fms. ft. in.	fms. ft. in.	fms. ft. in.	
10	17 0 6	13 4 0	11 5 9	11 2 4	10
20	34 1 0	27 2 0	23 5 6	22 4 8	20
40	68 2 0	54 4 0	47 5 0	45 3 4	40
60	102 3 0	82 0 0	71 4 6	68 2 0	60
80	136 4 0	109 2 0	95 4 0	91 0 8	80
120	205 0 0	164 0 0	143 3 0	136 4 0	120

N.B. The shrinking proportions of four-strand cable-laid cordage is exactly the same as three-strand, except in closing the cable, which consisting of four strands, lie much closer in the rope than three strands, but not having a heart to encompass it, does not diminish in length so much as cable-laid flays. The cable in closing will shorten $\frac{1}{12}$ parts of the length of yarn first warped.

It being rather unusual to lay cables with a greater number of strands than four, the above tables are not laid down for a greater proportion,—but to know how to find the number of threads to work *per* hook for a greater number may at some time be necessary, therefore the following me-

thod must be pursued to lay a cable in as many strands as may be thought expedient. Suppose a five-strand cable-laid rope is wanted to be made, you first square the size of the rope proposed to be made, and multiply that product by the size yarn you mean to make your cable from, that product divide by 52, and the quotient will be the number of threads to work *per* hook for a five-strand cable-laid rope. If for a six-strand, proceed as before, and divide by 62; for a seven-strand, divide by 72; for an eight-strand, divide by 82; and so on, adding 10 to your divisor for every strand you mean to increase in number in your cable.

TABLE X.

Shewing the Prime Cost to the Manufacturer in each Process, in making the undermentioned Sizes of three-strand cable-laid Cordage, with the Weight of Hemp and Tar required for each Rope.

Size.	Hatchelling, Wheel-turning, and Tending.	Expence at 5d. per Quarter			Spinning.			Expence at 7d. per Quarter.			Warping, Taking-up, and Tarring, at 9s. per Haul.			Laying at 7d. per Quarter.			Total Expence of Manufacturing into Cordage.			Weight of Hemp required for each Rope.		Weight of Tar required for each Rope.			
		L.	s.	d.	qr.	thds.	L.	s.	d.	L.	s.	d.	L.	s.	d.	L.	s.	d.	C.	qr.	lb.	C.	qr.	lb.	
5	7 3	0	3	9	22	3	0	13	1	0	2	10	$\frac{1}{2}$	0	15	5	1	15	$1\frac{1}{2}$	5	0	0	1	1	0
10	31 $1\frac{1}{2}$	0	15	$7\frac{1}{2}$	93	$4\frac{1}{2}$	2	14	$7\frac{1}{2}$	0	12	1	2	6	1	6	8	5	20	0	0	5	0	0	
15	70 $3\frac{3}{4}$	1	15	$3\frac{3}{4}$	211	$5\frac{3}{4}$	6	3	$6\frac{1}{4}$	1	7	3	5	17	10	15	3	11	45	0	0	11	1	0	
20	125 0	3	2	6	375	0	10	18	9	2	8	2	11	18	3	28	7	5	80	0	0	20	0	0	
24	180 0	4	10	0	540	0	15	15	0	3	9	5	15	11	6	39	5	11	115	0	23	28	3	5	

The above table is calculated according to the usual mode of rope-making, and is termed by the trade working by the square, which is performed in the following manner: Suppose a cable 15 inches in circumference, the square of 15 is 225, the half of which is 112 $\frac{1}{2}$; that is, 113 threads *per* hook must be laid up for a 15-inch cable, proceeding in the same manner for any size demanded, which mode of working answers to

sixteen-thread yarn in all sizes of three-strand cable-laid cordage.

Where the diameter and circumference of one rope to another is as 2 to 1, that is, where one rope is twice as big as another, the square of the diameter is as 4 to 1, which shews that one rope has four times as much yarn in it as the other, and consequently is four times as strong, according to the different magnitudes.

ROPE-MAKING.

TABLE XI.

Shewing the Number of Threads *per* Hook to work for three-strand hawser-laid Cordage, of 3, 6, 9, and 12 Inches in Circumference, of the Sizes of Yarn undermentioned, with the Weight of each Rope, and the Number of Men required to lay the same, with the Allowance to each Man for his Labour.

N ^o of Threads 99 to 100 lb. Weight.	16	17	18	19	20	21	22	23	24	25	Weight of each Rope 133.2 long.	Men for Rope.	Threads <i>per</i> Rope.
Size in Inches.	Threads <i>per</i> Hook.												
3	16	17	18	19	20	21	22	23	24	25	C. qr. lb. 2 2 17	8 0	6
6	64	68	72	76	80	84	88	92	96	100	10 2 12	22 0	12
9	144	153	162	171	180	189	198	207	216	225	23 1 13	37 0	15
12	256	272	288	304	320	336	352	368	384	400	42 1 20	45 0	15

Remarks.—In hardening the strands, and in laying hawser-laid cordage, it must be worked with (in addition to the weight of the sledge) one prefs-barrel for every twenty threads contained in the rope. This is to be considered as a standing rule in covered rope-grounds, but in open grounds the prefs must be varied according to the state of the ground, as mentioned in cable-laid cordage.

In laying three-strand hawser-laid cordage, if there is any doubt respecting the size of the yarn, you must girt the yarn you propose laying in two of your readys (or strands), and that should be just the size of the rope.

TABLE XII.

Shewing the Length of Yarn required to be warped, and the different shrinking Proportions of the Yarn in each Process, in making the undermentioned Lengths of hawser-laid Rope, and also the Weight.

	Fathoms of Rope in Length.	Length of Yarn to be warped.	The Sledge should move to the following Marks from the Tackle-Posts.		¾-Inch.	1½-Inch.	2-Inch.	4-Inch.	6-Inch.	8-Inch.	10-Inch.	12-Inch.
			Rope's Hardening Mark.	Rope's Length.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.
Half } Coil }	fms. ft. 10 0	fms. 15	fms. 12	fms. ft. 10 0	qr. lb. oz. 0 2 7½	qr. lb. oz. 0 4 15	C. qr. lb. oz. 0 0 9 14¼	C. qr. lb. oz. 0 1 11 9½	C. qr. lb. oz. 0 3 5 1½	C. qr. lb. oz. 1 1 18 6¼	C. qr. lb. oz. 2 0 23 8	C. qr. lb. oz. 3 0 20 6
	20 0	30	24	20 0	0 4 15	0 9 4	0 0 19 12½	0 2 23 3	1 2 10 3	2 3 8 12½	4 1 19 0	6 1 12 12
	40 0	60	48	40 0	0 9 14	0 19 12	0 1 11 9	1 1 18 6	3 0 20 6	5 2 17 9	8 3 10 0	12 2 25 8
	66 4	100	80	66 4	0 16 8	1 5 0	0 2 10 0	2 1 12 0	5 1 6 0	9 1 20 0	14 2 26 0	21 0 24 0
	80 0	120	96	80 0	0 19 12	1 11 8	0 2 23 2	2 3 8 12	6 1 12 12	11 1 7 2	17 2 20 0	25 1 23 0
	100 0	150	120	100 0	0 24 11	1 21 6	0 3 14 14½	3 2 3 15	7 3 22 15	14 0 15 14½	22 0 11 0	31 3 7 12
Whole } Coil }	120 0	180	144	120 0	1 1 10	2 3 4	1 0 6 11	4 0 26 2	9 2 5 2	16 3 24 11	26 2 2 0	38 0 20 8
	133 2	200	160	133 2	1 5 0	2 10 0	1 0 20 0	4 2 24 0	10 2 12 0	18 3 12 0	29 1 24 0	42 1 20 0

Remarks.—In hardening the strands the yarn will shrink one-fifth of the whole length, which is called the rope's hardening mark.

In laying the rope the strands will shrink one-sixth of the remaining distance, which brings the rope to the length required.

TABLE

ROPE-MAKING.

TABLE XIII.

Shewing the exact Cost to the Manufacturer in each different Process as undermentioned, in making the following Sizes of three-strand hawfer-laid Cordage, with the proper Proportions of Hemp and Tar necessary for each Rope.

Size in Inches.	Hatcheling, Wheel turning, and Tendring.	Expence at 6d. per Quarter.			Spinning.	Expence at 7d. per Quarter.			Warping, Taking-up, and Tarring Expence at 9s. per Hawl.			Laying Expence at 7d. per Quarter.			Total Expence of manufacturing into Cordage.			Weight of Hemp required for each Rope.			Weight of Tar required for each Rope.		
		qr. thds.	L.	s.		d.	qr. thds.	L.	s.	d.	L.	s.	d.	L.	s.	d.	L.	s.	d.	C. qr. lb.	C. qr. lb.	C. qr. lb.	
2	1 4	0	0	10	5 0	0	2	11	0	0	7 ¹ / ₂	0	1	9	0	6	11 ¹ / ₂	0	3	22	0	0	26
4	6 4	0	3	4	20 0	0	11	8	0	2	7	0	7	0	1	4	7 ¹ / ₂	3	3	23	0	3	21
6	15 0	0	7	6	45 0	1	6	3	0	5	8	1	5	8	3	5	1	8	1	27	2	0	13
8	26 4	0	13	4	80 0	2	6	8	0	10	3	1	15	0	5	5	3	15	0	10	3	3	2
10	41 4	1	0	10	125 0	3	12	11	0	16	1	3	5	7	8	15	5	23	2	10	5	3	14
12	60 0	1	10	0	180 0	5	5	0	1	3	2	3	5	7	11	3	9	33	3	22	8	1	26

The foregoing table is grounded (as termed by the trade) upon the principle of the square, but the method of working upon this principle differs between cable and hawfer-laid cordage. The mode pursued for making hawfer-laid cordage is as follows: Suppose it is wanted to make a three-strand hawfer-laid rope, six inches in circumference; the

square of 6 is 36, and twice 36 is 72, which is the number of threads to work *per hook* for a six-inch three-strand hawfer-laid rope. The same method must be pursued, according to this way of working, for any other size, and answers to eighteen-thread yarn in all three-strand hawfer-laid cordage. See Table XI.

TABLE XIV.

Shewing the Weight of Yarn (of the four most general Sorts made use of) capable of being spun by each of the following Number of Spinners, at eight Quarters, (or 48 Threads) *per day*, in 1 Day, 1 Week of 6 Days, 1 Month of 24 Days, and 1 Year of 13 Months; with the Yield of Cordage at the Year's End prefixed against each Number of Spinner's Work.

Nomb. of Spinners for	Weight of Yarn <i>per Day.</i>		Weight of Yarn <i>per Week.</i>		Weight of Yarn <i>per Month.</i>		Weight of Yarn <i>per Year.</i>		Yield of Cordage.	
	Cwt.	qrs. lbs.	Cwt.	qrs. lbs.	Tons.	cwt. qrs. lbs.	Tons.	cwt. qrs. lbs.	Tons.	cwt. qrs. lbs.
16-thread Yarn.	2	3 1 20	20 2 8	4 2 1 4	53 9 2 24	66 17 0 16				
	4	6 3 12	41 0 16	8 4 2 8	106 19 1 20	133 14 1 4				
	6	10 1 4	61 2 24	12 6 3 12	160 9 0 16	200 11 1 20				
	8	13 2 24	82 1 4	16 9 0 16	213 18 3 12	267 5 2 8				
	10	17 0 16	102 3 12	20 11 1 20	267 8 2 8	334 5 2 24				
	12	20 2 8	123 1 20	24 13 2 24	320 18 1 4	401 2 3 12				
18-thread Yarn.	2	3 0 0	18 0 0	3 12 0 0	46 16 0 0	58 10 0 0				
	4	6 0 0	36 0 0	7 4 0 0	93 12 0 0	117 0 0 0				
	6	9 0 0	54 0 0	10 16 0 0	140 8 0 0	175 10 0 0				
	8	12 0 0	72 0 0	14 8 0 0	187 4 0 0	234 0 0 0				
	10	15 0 0	90 0 0	18 0 0 0	234 0 0 0	292 10 0 0				
	12	17 0 0	108 0 0	21 12 0 0	280 16 0 0	351 0 0 0				
20-thread Yarn.	2	2 3 4	16 2 24	3 3 3 12	43 9 0 16	55 2 1 20				
	4	5 2 8	33 1 20	6 7 2 24	86 18 1 4	111 0 3 12				
	6	8 1 12	50 0 16	9 11 2 8	130 7 1 20	166 3 1 4				
	8	11 0 16	66 3 12	12 15 1 20	173 16 2 8	222 1 2 24				
	10	13 3 20	83 2 8	15 19 1 4	217 5 2 24	277 4 0 16				
	12	16 2 24	100 1 4	19 3 0 16	260 14 3 12	332 6 2 8				
25-thread Yarn.	2	2 0 22	13 0 20	2 12 2 24	34 5 1 4	42 16 2 12				
	4	4 1 16	26 1 12	5 5 1 20	68 10 2 8	85 13 0 24				
	6	6 2 10	39 2 4	7 18 0 16	102 15 3 12	128 9 3 8				
	8	8 3 4	52 2 24	10 10 3 12	137 1 0 16	171 6 1 20				
	10	10 3 26	65 3 16	13 3 2 8	171 6 1 20	214 3 0 4				
	12	13 0 20	79 0 8	15 16 1 4	205 11 2 24	256 19 2 16				

N.B. By the above table may be found how much yarn can be spun by any number of spinners in any given time whatever.

ROPE-MAKING.

TABLE XV.

Showing the Number of Threads to work *per* Hook, both in the Shank and Tapers, in making three-strand taper hawser-laid Cordage of the Sizes undermentioned, and the Lengths thereunto prefixed, with the Lengths of Yarn required to be warped for the frame, and the Difflance to be observed between the Tapers ; grounded upon 18, 20, and 25-thread Yarn, and tapered two-thirds the Length, and two-thirds the Size of the Rope.

Fathoms demanded.	Lengths of Yarn in the Shank or whole Parts.		Thread Yarn.	Inches.		Difflance between the Tapers.												
	fms. ft.	fms. ft.		2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2
5	7 3	2 3	18	2 1/2	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10
10	15 0	5 0	20	3	4	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10	10 1/2	200
15	22 3	7 3	25	4	5	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10	10 1/2	11	11 1/2	222
20	30 0	10 0	30	5	6	7	7 1/2	8	8 1/2	9	9 1/2	10	10 1/2	11	11 1/2	12	12 1/2	277
5	7 3	2 3	18	3	4	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10	10 1/2	67
10	15 0	5 0	20	4	5	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10	10 1/2	11	11 1/2	74
15	22 3	7 3	25	5	6	7	7 1/2	8	8 1/2	9	9 1/2	10	10 1/2	11	11 1/2	12	12 1/2	93
20	30 0	10 0	30	6	7	8	8 1/2	9	9 1/2	10	10 1/2	11	11 1/2	12	12 1/2	13	13 1/2	133
5	7 3	2 3	18	8	10	12	14	17	20	24	28	33	38	43	48	54	60	67
10	15 0	5 0	20	9	11	13	15	19	23	27	31	36	42	48	54	60	67	74
15	22 3	7 3	25	10	12	15	18	22	28	34	39	46	52	59	67	75	84	93
20	30 0	10 0	30	11	13	16	20	24	28	34	39	46	52	59	67	75	84	93
5	7 3	2 3	18	12	15	18	21	26	33	40	48	56	65	74	85	96	108	133
10	15 0	5 0	20	13	16	19	23	30	36	44	53	62	72	83	94	106	120	148
15	22 3	7 3	25	14	17	20	24	31	37	46	56	66	78	90	104	118	133	166
20	30 0	10 0	30	15	18	22	27	34	41	50	60	71	83	96	110	125	140	184

Fathoms demanded.	Lengths of Yarn in the Shank or whole Parts.		Thread Yarn.	Inches.		Difflance between the Tapers.													
	fms. ft.	fms. ft.		2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10
5	7 3	2 3	18	6 0	1 10 1/2	1 10 1/2	1 4 3/4	1 11 1/4	0 10 3/4	0 9	0 7 1/2	0 6 1/2	0 5 3/4	0 4 3/4	0 3 3/4	0 2 3/4	0 1 3/4	0 1 3/4	0 2 3/4
10	15 0	5 0	20	12 0	2 3 9	2 3 9	2 8 3/4	2 9 1/2	1 9 1/2	1 6	1 3	1 0 11 1/2	0 11 1/2	0 9 1/2	0 7 1/2	0 5 1/2	0 4 1/2	0 3 1/2	0 2 1/2
15	22 3	7 3	25	18 0	3 6 5 7/2	3 6 5 7/2	3 10 3/4	3 11 1/4	2 8 3/4	2 3	1 10 1/2	0 11 1/2	0 9 1/2	0 7 1/2	0 5 1/2	0 4 1/2	0 3 1/2	0 2 1/2	0 1 1/2
20	30 0	10 0	30	24 0	4 0 15 0	4 0 15 0	4 5 5 7/2	4 6 1 1/2	3 7 3/4	3 0	2 6 2 1/2	1 10 3/4	1 10 3/4	1 7 3/4	1 4 3/4	1 3 1/2	1 2 1/2	1 1 1/2	1 0 1/2
5	7 3	2 3	18	5 0	1 3 1/2	1 3 1/2	1 3 1/2	1 0 10	0 10	0 8 1/2	0 6 1/2	0 5 1/2	0 4 1/2	0 3 1/2	0 2 1/2	0 1 1/2	0 1 1/2	0 2 1/2	0 1 1/2
10	15 0	5 0	20	10 0	2 7 1/2	2 7 1/2	2 7 1/2	2 0 1 8	1 8	1 4 1/2	1 1 1/2	0 11 1/2	0 10	0 8 1/2	0 6 1/2	0 4 1/2	0 3 1/2	0 2 1/2	0 1 1/2
15	22 3	7 3	25	15 0	3 10 3/4	3 10 3/4	3 10 3/4	3 0 2 6	2 6	2 0 11 1/2	1 8 3/4	1 5 1/2	1 3 1/2	1 1 1/2	0 11 1/2	0 9 1/2	0 7 1/2	0 5 1/2	0 4 1/2
20	30 0	10 0	30	20 0	4 0 21 3/4	4 0 21 3/4	4 0 21 3/4	4 0 3 4	3 4	2 8 1/2	2 3 3/4	1 11 1/2	1 8 1/2	1 5 1/2	1 3 1/2	1 1 1/2	1 0 1/2	0 10 1/2	0 8 1/2
5	7 3	2 3	18	4 3 1/2	1 4 1/2	1 4 1/2	1 0 2 3/4	0 9 3/4	0 7 1/2	0 6 1/2	0 5 1/2	0 4 1/2	0 3 1/2	0 2 1/2	0 1 1/2	0 1 1/2	0 2 1/2	0 1 1/2	0 1 1/2
10	15 0	5 0	20	8 6 1/2	2 8 1/2	2 8 1/2	2 0 5 1/2	1 7 1/2	1 3 1/2	1 0 10 1/2	0 9 1/2	0 8 1/2	0 6 1/2	0 4 1/2	0 3 1/2	0 2 1/2	0 1 1/2	0 1 1/2	0 1 1/2
15	22 3	7 3	25	12 10 1/2	3 11 1/2	3 11 1/2	3 1 3/4	2 5 1/2	1 11 1/2	1 7 1/2	1 4 1/2	1 1 1/2	0 10 1/2	0 9 1/2	0 7 1/2	0 5 1/2	0 4 1/2	0 3 1/2	0 2 1/2
20	30 0	10 0	30	17 1 1/2	4 1 1/2	4 1 1/2	4 1 1/2	3 9 3/4	2 7 3/4	2 1 1/2	1 9 1/2	1 6 1/2	1 4 1/2	1 1 1/2	1 0 1/2	0 9 1/2	0 7 1/2	0 5 1/2	0 4 1/2

ROPE-MAKING.

TABLE XV.—continued.

Tapered half the Length and half the Size of the Rope.

Fathoms demanded.	Lengths of Yarn in the Shank or whole Parts.	Lengths of Yarn in the Head to the first Taper.	Lengths of Yarn to Taper.	Distance between the Tapers.																	
				Thread Yarn.	Inches.	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
5	7 3	3 4 6	3 4 6	5 7½	3	2	2½	3	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
10	15 0	7 3 0	7 3 0	11 3	6	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
15	22 3	11 1 6	11 1 6	16 10½	9	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
20	30 0	15 0 0	15 0 0	22 6	15	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
5	7 3	3 4 6	3 4 6	5 7½	3	2	2½	3	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
10	15 0	7 3 0	7 3 0	11 3	6	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
15	22 3	11 1 6	11 1 6	16 10½	9	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
20	30 0	15 0 0	15 0 0	22 6	15	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
5	7 3	3 4 6	3 4 6	5 7½	3	2	2½	3	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
10	15 0	7 3 0	7 3 0	11 3	6	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
15	22 3	11 1 6	11 1 6	16 10½	9	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
20	30 0	15 0 0	15 0 0	22 6	15	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

ROPE-MAKING.

Suppose you want to make a rope either cable or hawfer-laid, to be tapered one-third the length, and one-third the size; you must refer to Table V. or XIV. for making taper-cable, or hawfer-laid cordage, two-thirds the length and two-thirds the size, which you must work almost wholly the reverse way, by working the number of threads there mentioned to be worked in the tapers in the shank, and the number of threads in the shank must be worked in the tapers: the length of yarn there mentioned to be tapered must be the length in the head to the first taper, and the length

there mentioned in the head must be the length of the yarn to be tapered: the length of yarn requested to be warped for the shank will be the same as there mentioned, and the distance between the tapers will, in almost all cases, be the same as there nominated; but if at any time there should be a difference, and you are at a loss to find the distance between the tapers you must divide the length of yarn to be tapered by the number of threads you have to taper, and that will give the exact distance between them.

TABLE XVI.

Shewing the Number of Threads to work *per* Hook for four-strand hawfer-laid Cordage, from 2 to 12 Inches in Circumference, of the Sizes of Yarn as undermentioned: the Ropes to be laid without Hearts, the Yarns comprising which being equally divided in the Strands.

No. of Threads here mentioned to weigh 99 to 100lb.	16	17	18	19	20	21	22	23	24	25
Size in Inches.	Threads <i>per</i> Hook.									
2	5	6	6	6	7	7	7	8	8	8
4	22	23	24	25	26	27	29	30	32	33
6	48	51	54	57	60	63	66	69	72	75
8	84	90	96	101	107	112	117	122	128	133
10	133	142	150	158	167	175	183	192	200	208
12	192	204	216	228	240	252	264	276	288	300

Remarks.—It is very seldom that hawfer-laid cordage is composed of more than four strands, but for the sake of experiment, or otherwise, it might be demanded to contain a greater number: as such, the following rule, carefully attended to, will inform our readers how to lay a hawfer-laid rope in as many strands as may be considered expedient.

Suppose you want a five-strand hawfer-laid rope, you must square the size of the rope proposed to be made; that product multiply by the size yarn you propose making your rope from; the product of which, divided by 15, will give the number of threads to work *per* hook for a five-strand hawfer-laid rope. If you want to make a six-strand hawfer-laid-rope, you must proceed as above, and divide by 18; if a seven-strand, divide by 21; if an eight-strand, by 24; and so on, adding 3 to your divisor for every strand you mean to increase in the rope.

The shrinking proportion in making four-strand hawfer-

laid cordage, in the first process, is exactly the same as in three-strand; the only difference is in closing the rope, which, being composed of four strands, occasions the rope to lay more round and close than in three-strand cordage, which makes the shrinkage be in a much greater proportion. The rope, in closing, will shorten $\frac{3}{8}$ th parts of the remaining length of yarn, after the rope is hard, instead of $\frac{1}{2}$ th, as in three-strand hawfer-laid cordage.

The weight of each coil of four-strand hawfer-laid cordage may be nearly ascertained, by referring to the table of the weight of three-strand (Table XII.), there being as near the number of threads in each size rope as can possibly be laid, for each strand to have an equal number. But it should be remembered, that a coil of four-strand hawfer-laid rope, made out of 200 fathoms of yarn, will be only 130 fathoms long, instead of 133.2, as in three-strand hawfer-laid cordage.

TABLE XVII.

Shewing the Length of Yarn requested to be warped for the undermentioned Lengths of four-strand hawfer-laid Cordage, with the Hardening Mark prefixed against each respective Length.

Fathoms demanded.	Length of Yarn required.	Hardening Mark.
	fms. ft. in.	fms. ft. in.
10	15 2 6	12 2 0
20	30 5 0	24 4 0
40	61 4 0	49 2 0
60	92 3 0	74 0 0
80	123 2 0	98 4 0
100	154 1 0	123 2 0
120	185 0 0	148 0 0
130	200 2 6	160 2 0

ROPE-MAKING.

TABLE XVIII.

Shewing the shrinking Proportions of the Yarn, in making the undermentioned Lengths of Bolt-Rope; also its Weight (untarred), from 1 to 8 Inches in Circumference.

Length in Fathoms of Rope demanded.	Length of Yarn required in Fathoms.	The Sledge should move to the following Marks from the Tackle-Post, and is called the Rope's Hardening-Mark.	1-Inch.	2-Inch.	3-Inch.	4-Inch.	5-Inch.	6-Inch.	7-Inch.	8-Inch.
			Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.
		Fms. feet.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.
10	14	11 4	0 0 2 8 $\frac{1}{4}$	0 0 7 11	0 0 16 12 $\frac{1}{2}$	0 1 1 5 $\frac{3}{4}$	0 1 18 2 $\frac{1}{2}$	0 2 11 2	0 3 6 10	1 0 7 2 $\frac{3}{4}$
20	28	23 2	0 0 5 0 $\frac{1}{2}$	0 0 15 6	0 1 5 9 $\frac{1}{2}$	0 2 2 11 $\frac{1}{2}$	0 3 8 5	1 0 22 4	1 2 13 4	2 0 14 5
40	56	46 4	0 0 10 1 0 1	2 12	0 2 11 1 $\frac{1}{2}$	1 0 5 7	1 2 16 10	2 1 16 8	3 0 26 8	4 1 0 10
60	84	70 0	0 0 15 1 $\frac{1}{2}$	0 1 18 2	0 3 16 10	1 2 8 2 $\frac{1}{2}$	2 1 24 15	3 2 10 12	4 3 11 12	6 1 14 5
80	112	93 2	0 0 20 2 0 2	5 8	1 0 22 3	2 0 10 14	3 1 5 4	4 3 5 0	6 1 25 0	8 2 1 4
100	140	116 4	0 0 25 2 $\frac{1}{2}$	0 2 20 14	1 1 27 11 $\frac{1}{2}$	2 2 13 9 $\frac{1}{2}$	4 0 13 9	5 3 27 4	8 0 10 4	10 2 15 9
120	168	140 0	0 1 2 3 0 3	8 4	1 3 5 4	3 0 16 5	4 3 21 14	7 0 21 8	9 2 23 8	12 3 1 14
Coil 143	200	166 4	0 1 8 0 0 3	26 0	2 0 16 0	3 3 0 0	5 3 16 0	8 2 8 0	11 2 8 0	15 0 24 0

Remarks.—In hardening the strands, the yarn will shrink one-sixth part of the whole length, which is called the rope's hardening mark.

In laying the rope, the strands will shrink one-seventh part of the remaining distance, which brings the rope to the length required.

N. B. Bolt-rope is usually made of 20 or 25-thread yarn, and generally delivered from the rope-maker white;

the process of tarring it being usually performed by the fail-maker, and is called stoving it, it being done in a stove or oven calculated for the purpose. In laying up your work, you must work with the same number of threads as in common hawser-laid cordage. Bolt-rope, for exportation, is sometimes lightly tarred; in which case, in calculating the weight, you must add one-sixth to the weights hereunto annexed.

TABLE XIX.

Shewing the Number of Threads to work *per* Hook for three-strand hawser-laid white Cordage, from 1 to 12 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Weight of each Rope prefixed.

No. of Threads here-mentioned to weigh 84 lbs.	16	17	18	19	20	21	22	23	24	25	Weight of each Rope 133.2 Fathoms long.
	Threads <i>per</i> Hook.										
Size in Inches.											C. qr. lb.
1	3	3	3	3	3	3	3	4	4	4	0 1 12
2	8	8	9	9	10	10	10	11	12	12	1 0 8
3	18	19	20	21	22	23	24	25	26	27	2 1 12
4	32	33	35	37	39	41	42	44	46	48	4 0 20
6	72	76	80	84	88	92	96	100	104	108	9 1 20
8	128	135	142	149	156	163	170	177	185	192	16 2 24
10	200	211	222	233	244	255	266	277	289	300	26 0 16
12	288	304	320	336	352	368	384	400	416	432	37 2 24

N. B. Especial care should be taken relative to making white cordage for tackle-falls, cranc-ropes, &c. that the hemp be of the very best quality; and that the same be topped, *viz.* all the short hemp taken out by the hatcheller;

and that the spinner do spin his yarn for the same exceeding firm and even, by no means lighter than the weight specified under the article *spinning the yarn*: if he does, his rope will not answer the size required to be made.

ROPE-MAKING.

TABLE XX.

Shewing the Number of Threads to work *per* Hook for four-strand hawser-laid white Cordage, without Hearts, from 2 to 12 Inches in Circumference, of the Sizes of Yarn as undermentioned.

No. of Threads here mentioned to weigh 88 lbs.	16	17	18	19	20	21	22	23	24	25
	Threads <i>per</i> Hook.									
2	6	6	7	7	7	8	8	8	9	9
3	13	14	15	15	16	17	18	19	19	20
4	24	25	26	27	29	30	32	33	35	36
5	37	39	41	43	45	47	49	51	54	56
6	54	57	60	63	66	69	72	75	78	81
8	96	101	107	112	117	122	128	133	139	144
10	150	158	167	175	183	192	200	208	217	225
12	216	228	240	252	264	276	288	300	312	324

N. B. The weight of the above ropes may be found by consulting Table XVII. for three-strand hawser-laid white cordage; the number of threads in each rope of a size being of an equal number, as near as possible.

Cordage made by Contract for the Use of His Majesty's Navy.—The under-mentioned shews the number of threads to work *per* hook; the lowest weight, allowance in weight, bandage, and highest weight; the cordage is to be received and allowed for by the receiving officers of his majesty's re-

spective dock-yards, under the honourable commissioners of his majesty's navy, to rope-makers who have made cordage (upon the usual principle) by contract, in coils, hawsers, cablets, and cables, with the length of yarn to be warped for the same, and length of cordage when made, as ordered by the honourable navy-board.

N. B. The highest weight a hawl of yarn for each sort of cordage should weigh (and by no means more,) is here noted.

TABLE XXI. Cablets.

Size.	Threads <i>per</i> Hook.	Lowest Weight.	Allowance in Weight.	Bandage.	Highest Weight.
		C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.
2	3	1 1 4	0 0 4	0 0 4	1 1 12
2½	4	1 3 0	0 0 5	0 0 5	1 3 10
3	6	2 2 1	0 0 7	0 0 8	2 2 16
3½	8	3 1 2	0 0 10	0 0 11	3 1 23
4	10	4 0 18	0 0 12	0 0 13	4 1 15
4½	12	5 0 23	0 0 15	0 0 16	5 1 26
5	15	6 2 1	0 0 18	0 0 20	6 3 11
5½	18	7 3 7	0 0 22	0 0 24	8 0 25
6	21	9 0 12	0 0 26	0 1 0	9 2 10
6½	24	10 1 19	0 1 1	0 1 4	10 3 24
7	28	12 0 18	0 1 6	0 1 9	12 3 5
7½	32	13 3 16	0 1 11	0 1 14	14 2 13
8	37	16 0 6	0 1 17	0 1 21	16 3 16
8½	42	18 0 27	0 1 23	0 2 0	19 0 22
9	47	20 1 17	0 2 1	0 2 7	21 1 25
9½	52	22 2 9	0 2 7	0 2 13	23 3 1

TABLE XXII. Cables.

Size.	Threads <i>per</i> Hook.	Lowest Weight.	Allowance in Weight.	Highest Weight.
		C. qr. lb.	C. qr. lb.	C. qr. lb.
10	58	21 0 23	0 2 3	21 2 26
10½	64	23 1 17	0 2 9	23 3 26
11	70	25 2 10	0 2 15	26 0 25
11½	76	27 3 4	0 2 22	28 1 26
12	83	30 1 10	0 3 1	31 0 11
12½	90	32 3 17	0 3 8	33 2 25
13	98	35 3 9	0 3 16	36 2 25
13½	106	38 3 1	0 3 25	39 2 26
14	114	41 2 20	1 0 5	42 2 25
14½	122	44 2 12	1 0 12	45 2 24
15	130	47 2 3	1 0 21	48 2 24
15½	139	50 3 7	1 1 2	52 0 9
16	148	54 0 13	1 1 11	55 1 24
16½	157	57 1 16	1 1 20	58 3 8

It is to be observed, that the above sizes in Tab. XX., viz. 2 to 9½ inches, are termed, in the navy contracts, cablets, the yarn for which should be warped 200 fathoms long, and the cablets, when complete, to be 120 fathoms. A hawl of yarn containing 336 threads, should weigh from 16 cwt. 0 qr. 8 lb. to 16 cwt. 1 qr. 25 lb., and no more, allowing one-sixth part of such weight for tar, which is the allowance made by the honourable navy-board, and no more.

Cablets from 4 to 9½ inches will not be rejected, if they are half an inch in girt above the dimensions ordered.

The yarn for the above cables (Tab. XXII.) are warped 166 fms. 4 ft. long, and the cables, when complete, to be 100 fathoms long. A hawl of yarn containing 336 threads, 166 fms. 4 ft. long, should weigh from 13 cwt. 2 qr. 6 lb. to 13 cwt. 3 qr. 16 lb., and no more, tarred with the same proportion of tar as the yarn for the cablets before-mentioned.

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Cables 10 inches and upwards, are allowed three-fourths of an inch in girth more than the dimensions given.

In proportions of cordage wherein the cables contained in them do not exceed $13\frac{1}{2}$ inches in circumference, a proportion of $1\frac{1}{2}$ cwt. of spun-yarn is allowed to be sent to every ton of cordage; but if the cables are 14 inches in circumference and upwards, then 3 cwt. for every ton is allowed, in order to work up the toppings (or hemp) which should be taken out of the hemp agreeable to contract, previous to its being spun into cable-yarn (in particular), as it frequently happens that the great number of lives of some of his majesty's most valuable subjects are at stake upon the dependance of a single cable.

The cables made in the usual mode, by contract, have of late never exceeded $16\frac{1}{2}$ inches in circumference, (Tab. XXII. extends no further): for all the higher sizes are made by patent machines, by which much manual labour is spared, and the yarns and strands laid much closer and more even, and bear the strain more equally.

Size.	Threads per Hook.	Lowest Weight.	Allowance in Weight.	Bandage.	Highest Weight.
		C. qr. lb.	C. qr. lb.	C. qr. lb.	C. qr. lb.
$\frac{3}{4}$	2	0 1 4	0 0 1	0 0 1	0 1 6
1	3	0 1 20	0 0 1	0 0 1	0 1 22
$1\frac{1}{2}$	6	0 3 13	0 0 2	0 0 2	0 3 17
2	9	1 1 6	0 0 4	0 0 4	1 1 14
$2\frac{1}{2}$	14	2 0 5	0 0 6	0 0 6	2 0 17
3	20	2 3 20	0 0 8	0 0 9	3 0 9
$3\frac{1}{2}$	26	3 3 7	0 0 11	0 0 11	4 0 1
4	35	5 0 14	0 0 14	0 0 16	5 1 16
$4\frac{1}{2}$	44	6 1 22	0 0 18	0 0 20	6 3 4
5	54	7 3 19	0 0 22	0 0 24	8 1 9
$5\frac{1}{2}$	65	9 2 2	0 0 27	0 1 1	10 0 2
6	77	11 1 3	0 1 4	0 1 7	11 3 14
$6\frac{1}{2}$	91	13 1 11	0 1 9	0 1 13	14 0 5

The sizes of cordage hereunto annexed, from $\frac{3}{4}$ to $3\frac{1}{2}$ inches in circumference, are termed, in the navy, contract coils; all above, viz. 4 to $6\frac{1}{2}$ inch, are called hawfers. The yarn for both coils and hawfers should be warped 195 fathoms long, and the ropes, when completed, are to be 130 fathoms long. A hawl of yarn, consisting of 336 threads, 195 fathoms long, should weigh from 16 cwt. 1 qr. 7 lb. to 16 cwt. 2 qr. 24 lb. and no more, tarred in the same proportion as cables and cables.

All cordage delivered into his majesty's dock-yards undergo a trial, which is, by proving one strand out of each rope, each thread (or yarn) of which having a weight, weighing one-third of an cwt. made fast to it, which it should lift; but if a certain number of yarns (according to the size of each rope) should break in the trial, the rope is rejected, otherwise it is received.

Particular attention should be paid not to send any kind of cordage into his majesty's dock-yards above its highest weight, allowed according to contract, as, in such case, all above that weight will be a loss to the manufacturer; the receiving officer not being authorized to allow any more than is specified in the contract.

N. B. It is to be observed, that, in making cordage by contract for the use of his majesty's navy, his majesty finds his own hemp, the contractor tar and labour at a certain price per ton. All cables and cordage to be tarred with good Stockholm tar, without mixture of any

other, except about one-third part, which may be of Russia tar.

A white thread, twisted the contrary way, (sometimes called the rogue's yarn,) is to be laid in all the strands of the cables and large cordage; and a twine in the small cordage for the king's mark, so as to be seen on the outside of the strands.

In any of the strands, there is to be no greater number of threads at the ends of the cables or cordage than in the middle.

The only parliamentary regulations, relative to the manufacture of cordage, are contained in the following act; "An act for more effectually preventing deceits in the manufacturing of cordage for shipping; and to prevent the illicit importation of foreign-made cordage." 25 Geo. III. c. 56.

In July 1799, a patent was granted to W. Chapman and E. W. Chapman, of Newcastle-upon-Tyne, for their improved method of making cords and ropes, twined and untwined, from the spinning of the yarn inclusive, to the finishing of the rope or cordage. This invention appears, by the specification, to include material improvements in the spinning of rope-yarn, and in the manufacturing of cordage. Rope-yarns are at present spun by men, at an expence of from half a crown to five shillings per day, according to the situation of the place, whether in the out-ports, or on the river Thames. Or it is wholly spun by machinery.

In the practice of the first method rope-walks are necessary, and the fibres of the hemp are drawn into the yarn of different lengths proportionate in a given degree to their position in the outside or inside of the yarn; accordingly, when this yarn is strained, and its diameter collapses, the inside fibres of hemp bear the greatest strain, and thus they break progressively from the inside.

In the spinning by a mill the fibres are all brought forward in a position parallel to each other, previously to their receiving their twist. They are consequently all of one length; and, when twisted, the outside fibres are most shortened by forming the same number of spirals round a greater axis than the interior, and thus they must consequently break the first, on the same principle that the outside yarns of strands of ropes manufactured in the old method break before the interior yarns; and, consequently, with less strain than ropes of the improved principle, where the strands, (or immediate component parts of the rope) have been formed in such a manner as that all the yarns shall bear equally at the time of the rope's breaking.

Nevertheless, yarns spun by a mill have been found stronger than common yarns, on account of the great evenness with which they are spun; the manual labour in manufacturing is much less than in the common method; but, on the other hand, there is the expence of machinery, and the greater waste of hemp in preparing it for being drawn out in the progressive stages of its advance to the spindle.

The method invented by Messrs. Chapman differs from both the preceding, in having, by an easy and simple contrivance, the fibres of the hemp laid in the yarn in such a manner as the yarns themselves are laid in the strands of the rope manufactured on the new principle.

Their machinery consists only of a spindle, divided into two parts, the upper containing apparatus to draw forward the hemp from the spinner with twist sufficient to combine the fibres; which enables them to employ women, children, and invalids, and also to appropriate the rope-ground solely to the purpose of laying ropes.

The part we have described is only an improvement on

the methods of spinning, granted to Mr. William Chapman on the 8th day of November, 1798.

The remaining parts of their invention consist chiefly in the giving, from a stationary power, internal motion to a locomotive machine, *viz.* to the roper's sledge, on which the strands and the rope itself are twisted, by which contrivance they are enabled to apply a water-wheel, or steam-engine, to the whole process of making ropes of all kinds whatever.

Mr. Joseph Huddart of Ilington obtained a patent in August of the same year for an improved method of registering or forming the strands in the machinery for the manufacture of cordage. Having previously taken out a patent for this purpose, he contrived to effect it by the following means:

1. By keeping the yarns separate from each other, and drawing them from bobbins, which revolve, to keep up the twist whilst the strand is forming.

2. By passing them through a register, which divides them by circular shells of holes; the number in each shell being agreeable to the distance from the centre of the strand, and the angle which the yarns make with a line parallel to it, and which gives them a proper position to enter.

3. A cylindrical tube, which compresses the strand, and maintains a cylindrical figure to its surface.

4. A gauge to determine the angle which the yarns in the outside shell make with a line parallel to the centre of the strand when registering; and, according to the angle made by the yarns in this shell, the length of all the yarns in the strand will be determined.

5. By hardening up the strand, and thereby increasing the angle in the outside shell, which compensates for the stretching of the yarns, and the compression of the strand.

The patent which Mr. Huddart took out in August relates to the invention of a machine that may be worked by men, or any other power, and by means of which the registering may be commodiously and effectually carried on. But figures are necessary for describing intelligibly his peculiar contrivance. Mr. Huddart, in the following year, took out a patent for improvements in the method of turning cordage in the manufacture of it. But our limits forbid our enlarging on this article. The specifications of the patents for registering, as well as fastening, may be consulted by those who are concerned in this manufacture.

Rope Walk, or Rope-house Ground, is the place where ropes are manufactured. This should be 400 yards long, and about 10 broad. At the upper end are fixed the spinning-wheels, over which is the hatchelling-loft, also the back-frame wheels, tackle-boards, and posts, winches for winding the yarn on as it is spun, and reels on which to reel the ropes. On each side are stake-posts; in the middle is fixed the warping-post, and at the lower end, the capstern and reaching-post. Back-frame wheels for small, and sledges and drags for large ropes, are used towards the lower end; the back-frame wheel, for laying cordage from a six-thread ratline to a two-inch rope, is about four or five feet in diameter, and is hung between two uprights, fixed by tenons on a truck, and supported by a knee of wood. Over its top is a semicircular frame, called the head, to contain three whirls (that turns on the brasses) with iron spindles, secured by a hasp and pin. They are worked by means of a leather band encircling the whirls and the wheel. Three of the whirls are turned when hardening the strands, and one only when closing the rope, the strands being hung together upon it. The truck, on which the back-frame wheel is fixed, runs on four wheels, and is

made of three-inch oak plank, about nine feet long and thirteen inches broad at one end, and eleven inches broad at the other. The capstern, about eight feet high, and fourteen inches in diameter, is turned either by men or horses; its use is to draw the yarn, when tarring, out of the copper, through the nipper, to be coiled away in the yarn-house, and there properly hardened before it is used; otherwise it will kink, *i. e.* twist or curl, by being twisted too hard in closing. Another capstern, or crab, is fixed at the lower end of the walk, for stretching the yarn to its fullest extent, before it is worked into strands, by means of the tackle-fall, led from the sledge to the capstern; these being about eighteen yards distant from each other. The crank-wheel, which is used for spinning of lines, box-cord, &c. is fixed on an iron spindle or axis, with a handle by which to turn it. It hangs between two posts, and in its upper part, above the wheel, is let in a semicircular board to receive three sets of whirl-bolts, with wheels upon them, on which the spinners hang their threads: at the front side of the wheel is a short post, supported by a knee of oak, on which the spindle rests. The drags resemble the hinder part of the sledge, to which they are fastened by ropes, and they are lined with a board on the upper side: their weight serves as a press, when the rope requires more than the sledge can carry properly to stretch the strands, and prevent their kinking. The hatchel serves to clear the ends of the hemp, by drawing it through, having forty sharp-pointed iron-teeth, similar to the hatchel in the clearer, which has finer teeth. Iron-jacks are sometimes used instead of the table-wheel or back-frame wheel, and differ from the latter by having an iron-wheel with cogs, which work in the whirls, that have likewise iron-cogs. The looper, which is used to lay lines, has two iron swivel-hooks (running round in a brass or iron box) at each end, for the line to hang on and work, by the power of the fore-turn, from the wheel at the upper end. The nipper is formed of two steel-plates, with a semi-oval hole in each, which, by the motion of the upper plate, enlarges or contracts as the tarring of the yarn requires. It is thus fixed: a post is placed between the kettle and the capstern, with a mortise cut eighteen inches long from the kettle's surface, and five inches wide. The under plate is turned up on each side, to form two grooves, and is let into the front side of the post from the lower part of the mortise. The upper plate has a dove-tail on the back, that slides up and down in a groove into the grooves of the lower plate; and by a staff, made fast to its front, it is raised or lowered, and regulated by a weight suspended at the other end, so that the yarn receives no more tar than is required, and that which is squeezed out drops into a trough, and returns into the kettle. Press-barrels are old tar-barrels filled with clay, and laid on the sledge or drag to add weight when the rope is closing. The reaching-post is a post in the ground at the lower end of the walk; used in stretching the yarn by means of a tackle, one of the blocks of which is hooked to a strap round the post, the other block to a pendant at the sledge, being about eighteen yards distant from each other. Sledges are frames made of strong oak, clamped with iron in different parts; the two sides are the length of the sledge, made of oak, and tied in with oak bars at each end; near the front are two uprights, let into the sides, and supported by two slanting pieces from the upper end. A breast-board is fastened with iron pins to the uprights, and contains holes for the hooks to pass through, on which the hooks are hung; which, being turned by men, is twisted into rope, and so closed or finished. These sledges are loaded as the occasion of making the rope requires. The spinning-wheel is hung between two posts fixed

fixed in the ground; over its top is a semicircular frame, called the head, which contains twelve whirls, if it be for twelve spinners to spin at the same time; these whirls turn on iron spindles, with hooks to their front ends to hang the hemp on, and are worked by means of a leather band encircling the wheels and whirls. The tools and terms appropriate to rope-making are described in their proper places.

ROPE-Yarn, the yarn of any rope untwisted. It commonly consists of cable-ends which are worn out; and are called *junks of the cables*. It serves for many purposes among the sailors.

Rope-yarn properly denotes the smallest and simplest part of any rope, being one of the threads of which a strand is composed; so that the size of the latter, and of the rope into which it is twilled, are determined by the number of rope-yarns.

ROPES, Standing, in a *Ship*, the shrouds and stays are so called, because they are not removed, unless to be eased or set taught. See **SHROUDS**, and **STAYS**.

ROPES, Staple, ropes made of hemp, not inferior to clean Petersburg.

ROPE-Bands, braided cordage, used to fasten the heads of sails to their respective yards. See **ROBBINS**.

ROPE-Deck. See **DECK**.

ROPE, in *Agriculture*, a thick sort of cord formed of hemp, or other material; much used by farmers. See **CORDAGE**.

A very useful sort of rope for traces, and other similar purposes, has lately been formed of the coarse wool of sheep.

ROPE, Cart, that sort of rope used in loading hay, straw, or other bulky loads, by the farmer. These ropes should always be strong, and formed of the best materials, whatever the nature of them may be.

ROPE is also a word signifying to tedder, as a horse, or other animal. It is a very injudicious practice, and one which should by no means be generally followed by farmers.

ROPE, Cord, or *Strap*, in the *Manege*, is any of these tied round a pillar, to which the horse is fastened, when they begin to quicken, and supple, to teach him to fly from the chambrier, and not gallop faintly or incompactly.

In those maneges where there is no pillar, a man stands in the centre of the ground, and holds the end of the rope.

ROPES, Drag, in the *Artillery*, are those by which the soldiers pull the guns backwards and forwards both in their exercise, and in an engagement. They are of various lengths and dimensions, as they are used for guns or howitzers of different weights.

ROPES, Foot. See **FOOT-ROPES**.

ROPES of two Pillars, are the ropes or reins of a cavesson, used to a horse that works between two pillars. See **PILLAR**.

ROPE-Dancer. See **DANCER**, and **NUSANCE**.

ROPE of Sand, a phrase familiarly used to denote disunion, or want of adhesion and continuity. In this sense it is applicable to a variety of cases, and in military language to the disagreement that subsists between the colonel and the captains of a regiment.

ROPE Machine for raising Water, in *Hydraulics*.—If a vertical grooved wheel, fixed in a frame, be situated within the water at the bottom of a well, and another similar wheel, having a handle affixed to its axis, be situated in another frame at the upper part of the well; also an endless rope (*viz.* a rope whose two extremities are spliced into each other) be passed round both wheels; then, on turning the handle, the wheels and the rope will be caused to move,

viz. the rope will ascend on one side, and will descend on the other, passing successively through the water of the well; but the ascending part will carry up a quantity of water adhering to its surface; and this water differs in quantity, according to the size of the rope, the depth of the well, and the quickness of the motion; *viz.* with a larger rope, in a less deep well and quickest motion, a greater quantity of water will be raised, than otherwise.

In order to intercept the water at the top of the well, the upper wheel is inclosed in a pretty large box, in the bottom of which there are two holes, through which the ascending and descending parts of the rope pass. To these holes are affixed two short tubes, which prevent the exit of the water which falls to the bottom of the box. There is also a lateral spout on the side of the box, close to the bottom, for the water to come out of; and on the broad sides of the box there are two holes for the axis of the wheel. The 9th and 10th figures of *Plate XIV. Hydraulics*, exhibit a section and a front view of a machine of this sort, which was put up in the year 1782, on the castle hill at Windsor, where the depth of the well is 95 feet. A similar machine was also placed on the round tower of Windsor castle, which draws the water from the depth of 178 feet.

The same letters refer to the like parts in both figures.

The wheel, H, at the bottom of the well is of lignum vitæ, one foot in diameter. Its axis is of steel, and turns with its extremities in sockets of bell-metal.

The frame, I I, is of iron.

The wheel, E E, at the top of the well is of iron; but its rim, with the groove which receives the rope, are of lead. The diameter of this wheel is three feet.

The axis, *dd*, is of steel, and its extremities turn in bell-metal sockets, which are fixed in two upright posts, A, A, that support the machine. T is the handle affixed to the axis, which handle describes a circle of 28 inches in diameter; *bb* is the wooden box, lined with lead, which incloses the wheel E. F, F, are the holes at the bottom of the box through which the rope passes. Their diameter is about two inches.

On the same axis, *dd*, another wheel, C C, of about four feet in diameter, is fixed. This wheel is of wood, loaded on the edge with lead, and it serves as a fly to facilitate the motion.

The rope is of horse-hair, and measures half an inch in diameter.

With this identical machine, several experiments were tried, the result of which is as follows:

When the machine was worked slowly. *viz.* so as to make about 30 revolutions of the handle in one minute, then very little water came up adhering to the rope; and of this water a very small portion was separated from the rope within the box, so as to come out of the spout Z, in the side of the box.

When the revolutions of the handle were about 50 in a minute, then a considerable quantity of water came up adhering to the rope; and on turning the wheel E E round, the greatest part of that water, having acquired a considerable velocity, flew off in a tangent from the rope, and formed a jet within the box. This water, falling to the bottom of the box, came out of the spout Z.

It was found, that the utmost exertion of an ordinary working man could not make more than 60 revolutions of the handle in a minute; in which case the rope moved at the rate of about 16 feet *per second*. With this velocity the quantity of water that came out of the spout, Z, was about six gallons *per minute*: but it would have been impossible

possible for the man to have worked at that rate for more than three or four minutes.

This machine may evidently be placed afloat, *viz.* so as to convey the water from one place to another, which is not quite perpendicularly over the former. The same construction, and almost the same expence, will adapt the machine to wells of different depths, though the effects will not be always the same.

More than one rope, or a broad band instead of a rope, might be adapted to this machine, for which purpose, the wheels must have more than one (or a broad) groove, &c.

The greatest disadvantage of this machine is, that the rope does not last long. Its being always wet destroys it very soon. In putting on the rope, care must be had to foke it well in water before it be spliced; otherwise it will either be too tight, or it will break. A hair rope has been found to last longer than one of hemp. See Cavallo's *Elem. of Nat. and Exp. Philosophy*, vol. ii.

ROPI, in *Geography*, a town of South America, in the jurisdiction of Guamanga.

ROPITZ. See REPIZ.

ROPOUREA, in *Botany*. See CAMAX.

ROPPE, in *Geography*, a town of the Tyrol; 4 miles S.W. of Stams.

ROQUE, JOHN DE LA, in *Biography*, a writer of voyages and travels, was the son of a merchant at Marseilles. He studied in his native city, and afterwards travelled into the East, but in what capacity is not known. In 1689 he visited Syria, mount Lebanon, and other countries in the East. In 1715 he was a resident in Paris, and was there associated with his brother in publishing the "Mercur de France." He died in 1745, in his 84th year. The following is a list of his principal publications: "Voyage de l'Arabie Heureuse par l'Ocean oriental et le detroit de la Mer Rouge, fait par les François, &c. avec un Memoire concernant l'Arbre du Caffé," 1716. "Voyage de la Palestine, fait par l'Ordre de Louis XIV." 1717: to this is annexed a translation of Abulfeda's Description of Arabia. "Voyage de Syrie et du Mont Liban, &c. avec un Abrégé de la Vie de M. M. de Chastenil," 2 vols. He was a member of the Royal Academy of Belles Lettres at Marseilles.

ROQUE, LA, in *Geography*, a town of France, in the department of the Var; 6 miles S.W. of Brignoles.

ROQUE, Cape, a cape on the coast of Brasil. S. lat. 5°. W. long. 35° 40'.

ROQUEBROU, LA, a town of France, in the department of the Cantal, and chief place of a canton, in the district of Aurillac; 12 miles W. of Aurillac. The place contains 1277, and the canton 9812 inhabitants, on a territory of 310 kilometres, in 15 communes.

ROQUEBRUSSE, LA, a town of France, in the department of the Var, and chief place of a canton, in the district of Brignoles. The place contains 1436, and the canton 5220 inhabitants, on a territory of 187½ kilometres, in 8 communes.

ROQUECOR, a town of France, in the department of the Lot and Garonne; 7 miles N.E. of Agen.

ROQUE-COURBE, a town of France, in the department of the Tarn, and chief place of a canton, in the district of Castres; 4 miles N.N.E. of Castres. The place contains 1294, and the canton 3829 inhabitants, on a territory of 132½ kilometres, in 6 communes.

ROQUEFEUIL, a town of France, in the department of the Aude; 15 miles S.W. of Alet.

ROQUEFORT, a town of France, in the department of the Aude, and chief place of a canton, in the district of

Limoux; 7 miles S. of Quellan. The place contains 567, and the canton 4920 inhabitants, on a territory of 322½ kilometres, in 13 communes.—Also, a town of France, in the department of the Landes, and chief place of a canton, in the district of Mont-de-Marsan; 12 miles N.E. of Mont-de-Marsan. The place contains 1077, and the canton 8380 inhabitants, on a territory of 565 kilometres, in 14 communes.

ROQUELAURE, a town of France, in the department of the Gers; 3 miles from Auch.

ROQUE-LIMBAUT, LA. See ROQUETAIMBAUT.

ROQUEMADOUR, a town of France, in the department of the Dordogne; 12 miles S.E. of Sarlat.

ROQUEMAURE, a town of France, in the department of the Gard, and chief place of a canton, in the district of Uzès, on the W. side of the Rhone; 6 miles N. of Avignon.

ROQUE-D'OLMES, a town of France, in the department of the Arriège; 7 miles S. of Mirepoix.

ROQUEPIC, an island in the Indian sea, covered with cocoa and other trees, flowers, and odoriferous plants. N. lat. 9° 56'. E. long 95° 14'.

ROQUES, PETER, in *Biography*, a French Protestant divine in the 18th century, was born at Caune, in Upper Languedoc, in 1685. Having been educated for the ministry, he was chosen, at the age of 25, pastor of the French Protestant church at Basil, in connection with which he spent the remainder of his life. He died in 1748, at the age of 63. He was author of many works, which bore testimony to his learning, and the excellence of his judgment: of these, the principal are, "A Picture of the Behaviour of a Christian;" "The Evangelical Pastor;" "Elements of the Historical, Dogmatic, and Moral Truths contained in the Sacred Scriptures." He was the author of numerous papers inserted in the "Journal Helvetique," and "Bibliothèque Germanique."

ROQUESTARON, in *Geography*, a town of France, in the department of the Maritime Alps, in the district of Puget-Théniers. The place contains 344, and the canton 2224 inhabitants, on a territory of 217½ kilometres, in 7 communes.

ROQUET, in *Zoology*, the name of a species of American lizard, of small size, and of a reddish-brown colour, variegated with black and yellow spots. Its fore-legs are remarkably long for a creature of this kind; its eyes are particularly vivid and sparkling, and its head is carried continually erect; and the creature is almost always in motion, hopping about like a bird, and it usually carries its tail bent into a semicircle over the back. It is far from being shy or timorous, and is delighted at the sight of men; when tired with play or with running, it will open its mouth and pant, and loll out its tongue as the dogs do.

ROQUETAIMBAUT, in *Geography*, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the district of Agen; seven miles N.E. of Agen. The place contains 1294, and the canton 5494 inhabitants, on a territory of 87½ kilometres, in 10 communes.

ROQUETAS, a town of Spain, in the province of Grenada, on the coast of the Mediterranean; 10 miles S.W. of Almeria.

ROQUEVAIRE, a town of France, in the department of the Mouths of the Rhone, and chief place of a canton, in the district of Marseilles; 12 miles E.N.E. of Marseilles. The place contains 3182, and the canton 17,926 inhabitants, on a territory of 275 kilometres, in 10 communes.

ROQUILLE,

ROQUILLE, a measure of capacity in the West Indies; thus, the English gallon is divided into two pots, four pintes, eight chopines, sixteen roquilles, thirty-two maces, or sixty-four demi-muces.

ROQUITE, in *Geography*, a river of Africa, which runs into the Atlantic; 70 miles S.E. of cape Bajador.

ROR, a town of Bavaria; four miles S.W. of Abenperg.

RORAAS, a town of Norway, in the province of Drontheim; near which is a large copper mine, discovered in the year 1644; 68 miles S.S.E. of Drontheim. This mine is in the southern slope of the chain of Dofra, in a rock of what the Germans call horn-schiffer, or horn-blende slate. The veins are from six inches to six ells in thickness; and the ore of a pale yellow. The mines of Roraas are very productive, and a source of considerable revenue.

RORARIUS, JEROME, in *Biography*, who flourished about the middle of the 16th century, was a native of Pordenonè, in Italy, and in the course of time he became nuncio from pope Clement VII. at the court of Ferdinand, king of Hungary. He was author of a curious work, entitled "Quod animalia Bruta Ratione utantur melius Homine," in which he undertakes to shew, not only that beasts are rational creatures, but also that they make a better use of their reason than man. This work, after lying concealed in the obscure recesses of libraries 100 years, was published by M. Naude at Paris in 1645. Bayle.

RORBACH, in *Geography*, a town of Austria; 18 miles W. of Freystatt.—Also, a town of France, in the department of the Moselle, and chief place of a canton, in the district of Sarreguemines; six miles W. of Bitche. The place contains 655, and the canton 10,280 inhabitants, on a territory of 187½ kilometres, in 20 communes.—Also, a town of Germany, in the principality of Culmbach; seven miles S.S.E. of Gemunden.

RORE, in *Biography*. See CIPRIANO.

RORENTZBERG, in *Geography*, a mountain of Germany, on the Brisgau; two miles S. of Triberg.

RORHAW, a town of Austria; eight miles W.S.W. of Hainburg.

RORICHE, a river of Brandenburg, which runs into the Oder; three miles N.W. of Königsberg.

RORIDULA, in *Botany*, from *roridus*, moist with dew, in allusion to the glandular moisture which clothes its herbage, like that of *Drosera*, the Sun-dew.—Linn. Gen. 567. Schreb. 157. Willd. Sp. Pl. v. 1. 1184. Mart. Mill. Dict. v. 4. Juss. 426. Lamarck Illustr. t. 141. Gært. t. 62.—Class and order, *Pentandria Monogynia*. Nat. Ord. uncertain, Juss.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, equal, permanent leaves. *Cor.* Petals five, ovate-oblong, equal, larger than the calyx. *Stam.* Filaments five, awl-shaped, half the length of the corolla; anthers inserted a little above their base, oblong, of two parallel, nearly cylindrical lobes, opening obliquely at the top, and separated almost half way down; their base pouch-like, projecting downwards, termed by Linnæus the nectary. *Pist.* Germen superior, oblong; style thread-shaped, the length of the stamens; stigma abrupt, slightly three-lobed. *Peric.* Capsule oblong, triangular, of three cells and three valves, the partitions contrary to the valves. *Seeds* solitary, oval, angular at one side, minutely dotted in rows.

Eff. Ch. Corolla of five petals. Calyx of five leaves. Anthers with a pouch at the base. Capsule of three valves and three cells. Seeds solitary.

Obs. Linnæus describes numerous seeds, but Gærtner

and Jussieu found them solitary in each cell. There is no reason to suppose these writers did not examine the very identical species.

1. *R. dentata*. Linn. Gen. Pl. 567. Syst. Veg. ed. 14. 244. Willd. n. 1. (*R. muscicapa*; Gært. v. 1. 298. *Ireon verticillata*; Burm. Prodr. Cap. 6.) Native of bogs at the Cape of Good Hope, but apparently either in some remote tract, or not of frequent occurrence. The stem is shrubby, branched, round, smooth, purplish. Leaves numerous, crowded about the ends of the lateral shoots, linear-lanceolate, pointed, about two inches long, finely downy, deeply pinnatifid, or pectinate; their segments awl-shaped, fringed with glandular-tipped bristles. Flower-stalks first terminal, then lateral, solitary, racemose, woolly, longer than the leaves, each bearing about four large and handsome flowers. Bractæes and calyx fringed like the leaves. The petals seem to be white, or blush-coloured. This is a very fine and singular plant, with which it is pity we are not acquainted in a recent state. May it not be allied to *Jussieu's Tiliacæ*?

RORIFEROUS DUCT, *q. d.* dew dropping-pipe; a name given by some to the thoracic duct; from its slow manner of conveying, and, as it were, distilling, the chyle into the common stream of blood.

RORIPA, or **RORIPPA**, in *Botany*, Scop. Carn. ed. 1. 520. Adanson Fam. v. 2. 417, a name which Scopoli says he borrowed from Gesner, and by which he designated a genus, which he separated from *Sisymbrium*, on account of its coloured calyx, four converging glands, and short pods. The same author, in his second edition of *Flora Carniolica*, reduces this genus, as most others have done, to *SISYMBRIUM*; see that article.

RORNACH, in *Geography*, a town of the bishopric of Passau; two miles N. of Passau.

RORSBACH, a town of the Helvetic republic, belonging to the abbey of St. Gall; six miles N.E. of St. Gall.

RORSHEIM, a town of Westphalia, in the principality of Halberstadt; six miles N.E. of Osterwick.

ROS, DEW. See DEW.

Ros Solis, in *Botany*, Sun Dew, a plant so called from the clear drops of viscid moisture, standing on the bristles which clothe its foliage; most abundant and conspicuous in hot bright weather. See *DROSERA*.

Ros Vitrioli, among *Chemists*, is sometimes used for the first phlegm distilled from vitriol in balneo Mariæ.

Ros sur Couesnon, in *Geography*, a town of France, in the department of the Ille and Vilaine; seven miles E.N.E. of Dol.

ROSA, in *Botany*, an ancient and popular name, derived, with most probability, from the Celtic, *rôs* or *rhos*; whence comes also its Greek synonym, *ῥόδον*; and the name of the same flower in various modern languages, Rose, Rosa, &c. De Theis remarks, that the Celtic *rhodd*, or *rhudd*, red, is the primary root of these words, the rose colour being almost synonymous with redness. Hence also came *Rhus*, *Rubia*, *Rubus*, and the Greek name of the Pomegranate, *ῥοζα*, or *ῥοδινα*, still in use. All these words have a manifest reference to a red colour, in some part of each of the plants.—Linn. Gen. 254. Schreb. 341. Willd. Sp. Pl. v. 2. 1063. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 537. Prodr. Fl. Græc. Sibth. v. 1. 347. Ait. Hort. Kew. v. 3. 257. Pursh 344. Juss. 335. Lamarck Illustr. t. 440. Gært. t. 73.—Class and order, *Icosandria Polygynia*. Nat. Ord. *Seneciofa*, Linn. *Rosacea*, Juss.

Gen. Ch. *Cal.* Perianth of one leaf; tube swelling, ovate or globose, contracted at the top; limb spreading, in five deep,

deep, converging, long, narrow-lanceolate segments, two of which are usually fringed, at both edges, with unequal leafy appendages, the third at one edge only, the two remaining having both edges naked; in some species all are simple and naked. *Cor.* Petals five, inversely heart-shaped, the length of the calyx, and inserted into its neck. *Stam.* Filaments very numerous, capillary, short, inserted into the neck of the calyx; anthers roundish-triangular. *Pist.* Germens numerous, in the cavity of the calyx; styles as many, villous, very short, inserted laterally into each germen, and closely compressed by the neck of the calyx; stigmas obtuse. *Peric.* none, except a spurious berry, formed of the turbinate tube of the calyx become soft and coloured, of one cell, contracted and closed at the neck, crowned with the faded hardened segments of the limb. *Seeds* numerous, oblong, hard, angular, hispid, lining the interior surface of the calyx.

Eff. Ch. Petals five. Calyx urceolate, five-cleft, fleshy, contracted at the neck. Seeds numerous, hispid, lining the inside of the calyx.

No genus more natural than this, in habit, or technical characters, can possibly be found. The Rose is also the most favourite of plants in all countries of the globe, the type of beauty and love, bestowing its name to enrich other flowers, which derive from thence their chief celebrity, and taking unquestioned precedence in all matters of ornament or taste. But thorns are proverbially the accompaniments of roses; nor can any one be more sensible of this, than the botanist, who attempts to extricate and define the species of this beautiful family. Cultivated plants in general are known to sport in luxuriant varieties, often transient indeed, but sufficiently durable to cause much perplexity to the accurate observer. No wonder therefore that roses, so abundant in every garden, should assume various aspects from difference of soil and treatment; though less perhaps, than most other tribes, from cross impregnation. The habit of this genus is invariably shrubby, and almost universally prickly; the branches round; leaves alternate, pinnate with an odd leaflet, serrated, frequently prickly or glandular; one species only being known to have simple leaves, or, in other words, to want the lateral leaflets. Stipulas almost always united to the base of the common footstalk. Flowers terminal, stalked, usually red, variously and deliciously fragrant; sometimes white; very rarely yellow, and in that case either inodorous or foetid. Fruit harmless, but seldom pleasant. Seeds slow in germination.

The generality of writers on Roses have come under the description of florists rather than botanists, and their figures have been executed accordingly. Linnæus found the determination of species very difficult. Ehrhart paid considerable attention to the subject, and in his *Beiträge* has thrown much light upon it, by which Willdenow has profited. The garden Roses are well arranged in the new edition of Aiton's *Hortus Kewensis*, where we shall find but little to improve or correct; and they are elegantly displayed in Miss Lawrence's ample collection of figures, published in 1799, except that we could have wished for much more delicacy, and discrimination of tints, in their various foliage. Several new British ones have been first described, by the writer of the present article, in *English Botany*, where Mr. Sowerby has, as usual, been happy in his representations of their distinctive habits and characters.

The species are distributed by Linnæus, and all his followers, into two sections, distinguished by the shape of the tube of the calyx, inaccurately termed by him the germen. Of this error Willdenow takes notice, without correcting it, not being at that time aware of the measure adopted in

our *Flora Britannica*, where, by substituting *fruit* for *germen*, every inconvenience and inaccuracy is avoided. Mr. Dryander and Mr. Aiton in *Hort. Kew.*, while they follow, as we shall here do, Willdenow's general and particular distribution of the species, have, in the point just mentioned, corrected his phraseology. Our new species, chiefly supplied by English Botany, and Pursh's *Flora of North America*, will be inserted, as nearly as possible, according to their affinities. Perhaps some of the old ones might have been better placed; but except any glaring impropriety presented itself, more inconvenience than benefit would arise from disturbing an arrangement so generally received, and which Linnæus first formed in his *Systema Nature*, ed. 12. We have only brought *canina* and its allies nearer together than they are placed in the above-mentioned books.

Section 1. *Fruit nearly globose.*

1. *R. berberifolia.* Barberry-leaved Rose. "Pallas in *Nov. Act. Petrop.* v. 10. 379. t. 10. f. 5." Willd. n. 1. Ait. n. 1. (*R. simplicifolia*; *Salis. Hort.* 359. *Parad.* t. 101. *Poiret in Lamarck Dict.* v. 6. 276.)—Fruit globose, prickly, as well as the flower-stalk. Leaves simple, nearly sessile, with stipulary recurved prickles. Found by Michaux and Olivier in the north of Persia. Seeds sent by the former to sir J. Banks were raised at Kew about the year 1790, but the plants did not long survive. This species is extremely remarkable for its simple leaves, which are obovate, glaucous, coarsely serrated, about an inch long, smooth, on short stalks, without stipulas, but having in their stead a pair of recurved taper prickles, spreading from the base of each footstalk. The branches are also beset with shorter prickles. Flowers solitary, on short, terminal, prickly, downy stalks. Petals yellow, crimson at the base. Fruit globular, very prickly, crowned with the simple narrow segments of the calyx. We wish the name *simplicifolia* had been retained, as much the best; and if Jusseu had actually given it as a name, in his *Gen. Pl.* 452, it might, by the right of priority, have superseded Pallas's appellation.

2. *R. lutea.* Yellow Sweet-briar. *Mill. Dict.* ed. 8. n. 11. Willd. n. 2. Ait. n. 2. *Curt. Lond.* t. 363. *Lawr. Ros.* t. 12. *Lob. Ic.* v. 2. 209. *Ger. Em.* 1267. (*R. lutea simplex*; *Bauh. Pin.* 483. *R. Eglanteria*; *Linn. Sp. Pl.* 703. *R. chlorophylla unicolor*; *Ehrh. Beitr.* v. 2. 70. *Arb.* 156. *R. fectida*; *Herm. Ros.* 18. *Allion. Ped.* v. 2. 138.)

β. bicolor. Austrian Rose, or Copper Sweet-briar; *Jacq. Hort. Vind.* v. 1. t. 1. *Curt. Mag.* t. 1077. *Lawr. Ros.* t. 6. (*R. fylvestris austriaca, flore pheniceo*; *Hort. Angl.* 66. t. 18.)—Fruit globose, smooth, as well as the flower-stalk. Calyx and leaf-stalks minutely prickly. Prickles of the branches straight. Leaflets obovate, doubly serrated, rather glutinous, smooth.—Native of Germany and Italy; but not, as Willdenow reports, of England. It is however frequent here in old country gardens, in a pure air, flowering in June. Gerard cultivated this species, and even raised it from seed, in order to refute a vulgar error, of its being some common rose, turned yellow by grafting on a broom-stock. The beautiful red or copper-coloured variety, *β*, is more difficult of cultivation, especially with respect to air. The stem is bushy, four or five feet high. Leaves deciduous, of five or seven obovate, strongly serrated, deep green, shining leaflets, rather viscid to the touch, and exhaling a most sweet and peculiar aromatic odour, more grateful to us than that of the Common Sweet-briar. Flowers copious, large, usually of an uniform golden yellow, with the smell of bugs; but in the variety *β* the upper side of the petals is of a tawny red, and the disagreeable

ROSA.

agreeable odour is left. We have, under the article EGLANTERIA, given the history of Linnæus's mistake, in confounding the present species, first with the Common Sweetbriar, and then with the Double Oriental Yellow Rose, (see hereafter *R. sulphurea* and *R. rubiginosa*); as well as our reasons for following the Hort. Kew., Willdenow, &c. in these names. The fruit of *R. lutea* has never been seen or heard of by us, in a state of maturity.

3. *R. sulphurea*. Double Yellow Rose. Ait. Hort. Kew. ed. 1. n. 2. ed. 2. n. 3. Willd. n. 3. Lawr. Ros. t. 77. (*R. glaucophylla*; Ehrh. Beitr. v. 2. 69. *R. hemisphærica*; Herm. Ros. 18. *R. lutea multiplex*; Ger. Em. 1267. Hort. Angl. 66. t. 18. *R. lutea maxima*, flore pleno; Hort. Eyfl. vern. ord. 6. t. 2. f. 4. *R. flava*, pleno flore; Cluf. Cur. Post. 6.)—Fruit globose, somewhat prickly. Flower-stalks smooth. Stem with two sets of copious straight prickles. Stipulas jagged. Leaflets obovate, simply serrated, glaucous, smooth. This fine and singular species, strangely confounded, by many botanists, with the last, was received by Clusius from the Levant, but its native country is not precisely known. It has been cultivated in England for near 200 years, and is perfectly hardy as to cold, but very impatient of low, confined, or smoky situations; nor does it, in the most favourable, often expand its copious and truly glorious flowers to advantage. We have seen them in the greatest perfection, on a poor gravelly soil, exposed to east winds, about outhouses and hovels, where no care was taken of the plant. The bush is larger than *R. lutea*, and evidently distinguishable by the pale glaucous hue of its smooth inodorous leaves. The prickles of the stem are of two kinds; some twice as large as the others. Flowers large and very double, without scent, of a rich but delicate golden yellow; their inner petals, when perfect, so profusely and elegantly crumpled, and so brightly transparent, that neither the structure, nor the colour, of any other rose, can give the slightest idea of their beauty; much less has any artist, except perhaps Van Huysum, in one or two of his finest pictures, done this flower tolerable justice. The foliage in Miss Lawrance's plate is much too dark, and wants the glaucous pale aspect which characterizes the species. The flower is well drawn in the old Hortus Eyfletensis.

4. *R. Banksia*. Lady Banks's Rose. Ait. n. 4.—“Smooth, naked, and without prickles. Fruit globose. Leaves ternate or pinnate, shining. Stipulas setaceous, distinct.”—Native of China, from whence it is said to have been brought, by Mr. W. Kerr, in 1807. It is marked, by Mr. Aiton, as a green-house shrub, blossoming in June and July. We have seen neither specimen nor figure.

5. *R. blanda*. Labrador, or Hudson's bay, Rose. Ait. Hort. Kew. ed. 1. n. 3. ed. 2. n. 5. Willd. n. 4. Pursh n. 1. Lawr. Ros. t. 27.—Fruit globose, smooth. Adult stems, like the flower-stalks, quite smooth, and without prickles.—Native of the most northern parts of America, on the east, as well as west, coasts, flowering there, as in our gardens, from May to August. Mr. Gordon is known to have cultivated it in 1773, but the species has not excited general notice. The young branches, and their leaf-stalks, bear copious, straight, red prickles, but they afterwards become smooth, naked, red and shining. The leaflets are usually seven, oblong, or obovate, large, varying in breadth. Stipulas broad and long, with glandular spreading points. Flowers solitary, moderately large, crimson. Tube of the calyx short, and almost hemispherical; segments long and simple, tapering gradually to a point.

6. *R. cinnamomea*. Cinnamon Rose. Linn. Sp. Pl. 703. Willd. n. 5. Ait. n. 6. Engl. Bot. t. 2388. Ger. Em. Vol. XXX.

1268. Lawr. Ros. t. 34. (*R. fluvialis*; Fl. Dan. t. 868. Retz. Scandin. ed. 2. 120. *R. majalis*; Herm. Ros. 8. Rosier printanier; Reynier Mém. de la Suisse, v. 1. 222.)

β. *R. collincola*; Ehrh. Beitr. v. 2. 70. Arb. 25. Fruit globose, smooth as well as the flower-stalks. Stem with occasional, small, twin prickles, below the stipulas. Flower-stalks scarcely prickly. Leaflets oblong, finely downy, glaucous beneath.—Native of Germany, Switzerland, Sweden, and Denmark; first observed wild in England by Mr. Salisbury, in the wood in Aketon pasture, near Pontefract, Yorkshire. In gardens the double variety is common. This is one of our earliest Roses, flowering in May. The bush is rather tall, with brown or reddish twigs, shining and smooth, except the small, and not universal, twin prickles, under each stipula. The leaves have a dull glaucous aspect, and are usually elliptic-oblong, unequally serrated; in β, Ehrhart's *collincola*, which our friend Dr. Afzelius is inclined to make a distinct species, they are broader and more obtuse, but we can find no permanent specific mark. Still less can we distinguish, even as a variety, the *fluvialis* of Fl. Dan. The flowers are of a delicate purplish bluish-colour, at least such are the double ones, seen in gardens; in which we could never detect any of the cinnamon scent, mentioned by Bauhin, to justify the name. The fruit of the wild kind is small, globose, scarlet. Segments of the calyx simple, long, and slender, for the most part slightly spatulate at the end, but not invariably so. The bush, when young, is sometimes very prickly.

7. *R. kamtschatica*. Kamtschatka Rose. Venten. Hort. Cels. t. 67, not 68. Ait. n. 7.—Fruit globose, smooth as well as the flower-stalks. Stem downy, very prickly. Leaf-stalks somewhat prickly. Leaflets obovate, abrupt.—Native of Kamtschatka.—Sent to Kew by M. Cels, from his garden at Paris, in 1802; but it was, long before, cultivated in Chelsea garden, from whence we received a specimen in 1791. Every part is larger than the preceding. The stem is downy, and armed with numerous, scattered, straight, pale, slender prickles; some of which are also found on the leaf-stalks. Leaflets usually seven, of a pale glaucous green, veiny and rugged; somewhat downy beneath; coarsely serrated, abrupt and emarginate. Stipulas obovate, dilated, obtuse, veiny and downy. Flowers solitary, purplish rose-coloured, fragrant. Segments of the calyx simple, entire, spatulate at the ends. Fruit small, globose, red. Perhaps this species ought to have been introduced between *blanda* and *cinnamomea*.

8. *R. arvensis*. White Dog Rose. Hudf. Angl. ed. 1. 192. Linn. Mant. 2. 245. Willd. n. 6. Ait. n. 8. Fl. Brit. n. 2. Engl. Bot. t. 188. Lawr. Ros. t. 86. (*R. sylvestris*; Herm. Ros. 10. *R. Herporhodon*; Ehrh. Beitr. v. 2. 71. *R. serpens*; Ehrh. Arb. 35. *R. sylvestris folio glabro*, flore planè albo; Bauh. Hist. v. 2. 44.)—Fruit nearly globose, smooth. Flower-stalks glandular, somewhat cymose. Prickles of the stem and leaf-stalks hooked. Styles elongated, combined.—Native of England, Germany, and Switzerland. It often decorates, in profusion, the hedges and thickets of the gravelly counties of England, flowering in June and July, when its long, trailing, purplish-brown twigs, and copious milk-white blossoms, are highly ornamental. We believe this species is unknown in Sweden and Denmark; for the t. 398 of Fl. Dan. cited by Linnæus, whom Willdenow like Hudson copies, is most evidently, as it calls itself, *spinosissima*. There is a glaucous hue on the young shoots, as well as on the backs of the leaflets, which are mostly five, oval, pointed, smooth, with sharp unequal serratures. Stipulas linear, pointed. Flower-stalks rough with glandular bristles, not prickly. Base of the calyx smooth and ovate,

but the *fruit* is globose, of a deep red, crowned with the elongated *styles*, so combined as to seem one.

9. *R. spinosissima*. Burnet Rose. Linn. Sp. Pl. ed. 1. 491. ed. 2. 705? Willd. n. 8. Ait. n. 9. Fl. Brit. n. 1. Engl. Bot. t. 187. Fl. Dan. t. 398. Lawr. Ros. t. 48 and t. 78. Ehrh. Arb. 85. (*R. pimpinellifolia*; Linn. Syst. Nat. ed. 10. 1062. Sp. Pl. 703. R. n. 1106; Hall. Hist. v. 2. 40. *R. campestris spinosissima*, flore albo odoro; Bauh. Pin. 483. *R. campestris odora*; Clus. Pan. 111. *R. campestris odorato flore*; Clus. Hist. 116. *R. pimpinellae folio*; Ger. Em. 1270.)—Fruit globose, smooth as well as the flower-stalks. Prickles of the stem very numerous, straight and setaceous. Leaflets roundish, smooth. Calyx of the fruit reflexed.—Native of sandy downs near the sea, as well as the borders of fields, and mountains, in various parts of Europe, not uncommon in Britain, flowering in July.—This is a bush of humble growth, seldom more than two or three feet high, and much branched. The *stem* is copiously clothed with innumerable, straight, crowded, needle-like, pale prickles. The *leaf-stalks* are occasionally prickly. *Leaflets* seven or nine, roundish, or slightly elliptical, obtuse, serrated, small, even and smooth, a little glaucous, not shining. *Flower-stalks* terminal, solitary, single-flowered, rather swelling upwards, always, as far as we have seen, smooth and naked. *Germs* depressed, and nearly hemispherical. Segments of the *calyx* tapering, smooth, and entire. *Flowers* with a light pleasant scent, usually cream-coloured, yellow in the middle; but Miss Lawrence's t. 78 represents the red variegated variety, first described by Sibbald in his Scotia Illustrata, p. 2. 46. t. 2, under the name of *R. Cypriana*. The *fruit* is much larger than the leaflets, globose, dark purple, and finally quite black, with large seeds, and crowned with the reflexed *calyx*.—We feel no scruple in referring the *pimpinellifolia* of Linnæus to his *spinosissima*, of which it is not even a variety; but we cannot take into consideration all the different things which various authors have supposed one or other of these species. We shall notice *pimpinellifolia* of Villars under *alpina*. Miss Lawrence's t. 15 and t. 19, are doubtful, on many accounts. The former indeed answers to our next species. Her t. 63 is surely different from both. The synonyms of old writers, regarding this Rose, are very puzzling, nor have they ever been well explained. The figure in Clusius's Stirp. Pannon. 114, belongs in truth to *spinosissima*, as he gives it in his Historia; while his 4th Rose, or *χαμαιροδον* of the former work, to which that figure seems annexed, is *pumila* of Jacquin. His other cut, at p. 111, more resembles *cinnamomea*, which is often very prickly the first season, as professor Swartz remarks. Our learned correspondent just named likewise suggests that the *cinnamomea* is one of various things which Linnæus in Fl. Suec. confounded under the name of *spinosissima*. Haller has certainly not adverted to all the Roses known to be found in Switzerland, but his n. 1106 can be no other than our *spinosissima*.

10. *R. rubella*. Red-fruited Dwarf Rose. Sm. Engl. Bot. t. 2521. (*R. spinosissima* γ ; Fl. Brit. 537? β ; Lawr. Ros. t. 15.)—Fruit globose, somewhat bristly. Flower-stalks bristly. Prickles of the stem very numerous, straight, and setaceous. Leaflets elliptical, smooth. Calyx of the fruit inflexed.—Gathered near Newcastle, by Mr. Winch. We have also specimens from Mr. James Backhouse, who has just informed us that he finds the inflexed *calyx*, after flowering, an invariable character of this species, that of the foregoing being always reflexed. The rough *flower-stalks* are less unalterable, though tolerably constant. The scarlet *fruit* is a very remarkable difference. The *flowers* are elegantly tinged with red. Mr. Backhouse thinks this rather

the taller-growing shrub of the two, and he observes that the *leaves* fold together, or *sleep*, at night. We know not whether this is the case with *spinosissima*.

11. *R. involuta*. Dr. Walker's Rose. Fl. Brit. 1398. Engl. Bot. t. 2068. Ait. n. 10.—Fruit globose, very prickly as well as the flower-stalks. Prickles of the stem very numerous, and nearly straight. Petals involute and imperfectly expanded. Leaflets elliptical, hairy beneath.—Native of the Hebrides, where it was gathered by the Rev. Dr. Walker, and Mr. J. Mackay.—The present species has the general habit, and very prickly *stem*, of the two last. But the *flower-stalks*, *leaf-stalks*, and young *fruit*, are all extremely prickly, the latter being more disposed to be ovate than depressed. The *leaflets* are more elliptical, their under side hairy, especially the ribs. Segments of the *calyx* long, simple, pointed, rough externally with glandular prickles. *Petals* pale blush, with deeper tints here and there, concave and involute, seldom more than half expanded. Ripe *fruit* unknown to us.

12. *R. parviflora*. Small American Rose. Ehrh. Beitr. v. 4. 21. Willd. n. 9. Pursh n. 2. (*R. caroliniana*; Michx. Boreal-Amer. v. 1. 295. *R. carolina*; Sm. Inf. of Georgia, v. 1. 49. t. 25.)—Fruit globose, slightly depressed, bristly as well as the flower-stalks and calyx. Leaf-stalks downy, somewhat prickly. Prickles in pairs under the stipulas, straight. Leaflets elliptic-lanceolate, simply serrated, smooth. Flowers solitary or in pairs.—“Native of woods on the sides of hills, from New York to Carolina, flowering in June and July. About two feet high. There are a number of varieties of this species.” Pursh. Our specimens, sent by the Rev. Dr. Muhlenberg, answer well to the figure above cited, and have, like that, solitary *flowers*, of a pale pink hue. The *stem* is slender and smooth, except a pair of awl-shaped, slender, straight prickles under each *stipula*. *Leaflets* five, elegantly elliptical; their common *stalk* reddish, channelled, prickly, somewhat downy, or hairy. The Rose in Dill. Elth. t. 245. f. 316, is exactly our's, though quoted by authors for the *lucida*.

13. *R. nitida*. Polished American Rose. “Willd. Enum. 544.” Pursh n. 3.—“Fruit globose. Calyx, flower-stalks, and branches hispid. Leaf-stalks rather downy, without prickles. Leaflets oblong-lanceolate, polished and smooth on both sides.”—In Pennsylvania and Virginia, flowering from June to August. *Petals* red, obovate. *Leaflets* seven. Pursh. We have not met with any specimen or figure.

14. *R. lucida*. Shining American Rose. Ehrh. Beitr. v. 4. 22. Arb. 76. Willd. n. 10. Pursh n. 4; excluding the synonym of Dillenius. (*R. alpina* β ; Ait. n. 27. Lawr. Ros. t. 75.)—Fruit globose, depressed, rather hispid as well as the flower-stalks. Leaf-stalks somewhat prickly, not downy. Prickles usually in pairs under the stipulas, straight. Leaflets ovato-lanceolate, bluntish, coarsely serrated, very smooth, shining. Corymbs of few flowers.—On the borders of swamps, from New York to Carolina, flowering in July and August. From four to six feet high. Pursh. By Ehrhart's specimen, the only one we have seen, it evidently appears, that the *R. carolina fragrans, foliis mediocribus ferratis*; Dill. Elth. 325. t. 245. f. 316, is very erroneously referred by Willdenow and Pursh to the present species; belonging, if we are right in what we take for *parviflora*, n. 12, indubitably to that plant. The present has seven *leaflets*, of a larger size and firmer texture. Stipulary *prickles* shorter, thicker, not always present. *Flowers* corymbose, four or five together. If we are right in Miss Lawrence's figure, this species, as well as *parviflora*, ought to be placed on the list of our garden plants.

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15. *R. gemella*. Twin-flowered American Rose. "Willd. Enum. 544." Pursh n. 5.—Fruit globose, smooth as well as the flower-stalks. Flowers mostly in pairs. Leaflets elliptic-oblong, opaque; their veins hairy beneath. Leaf-stalks downy. Prickles in pairs under the stipulas, hooked.—On dry sunny hills, from New England to Carolina, flowering in July and August. A low *shrub*, with large red flowers. Pursh. Specimens in the herbarium of Linnæus, referred by him to *R. carolina*, have slender branches, quite smooth, and somewhat glaucous. Leaflets seven, smaller, thinner, and more acutely serrated than the last; rather glaucous and downy beneath; their veins as if fringed. Leaf-stalks and stipulas finely downy and hoary. Flowers terminal, in pairs, on short smooth stalks, enveloped in large downy bractæas. Germen exactly globular, quite smooth and naked. Segments of the calyx smooth at the base, downy at the edges and upper part, simple; spatulate at the end.

16. *R. Lyonii*. Lyon's American Rose. Pursh n. 6.—"Fruit nearly globose, smoothish. Flower-stalks hispid, mostly ternate. Leaf-stalks rather prickly. Stem with straight scattered prickles, not hairy. Leaflets ovate-oblong, acute, serrated; smoothish above; downy beneath; the upper leaves simple. Stipulas linear. Segments of the calyx downy, linear, scarcely lacinated."—Gathered by Mr. Lyon in Tennessee, North America, flowering in July. The leaflets are three or five, small, with coloured veins. Flowers pale red. Pursh.

17. *R. setigera*. Fringe-cupped American Rose. Mich. Boreal-Amer. v. 1. 295. Pursh n. 7.—"Fruit globose. Stalks and ribs of the leaves prickly. Branches not hairy; their prickles in pairs or scattered. Leaflets pointed, smooth. Segments of the calyx fringed with bristles."—In swamps of Virginia and Lower Carolina, flowering in June and July. From five to eight feet high. Leaflets three or five. Pursh.

18. *R. carolina*. Carolina Rose. Linn. Sp. Pl. 703, omitting the reference to Dillenius. Willd. n. 11. Ait. n. 11. Pursh n. 8. Lawr. Ros. t. 24, t. 3, t. 54; also perhaps t. 68, and t. 66; scarcely t. 36. (*R. corymbosa*; Ehrh. Beitr. v. 4. 21.)—Fruit globose, bristly as well as the flower-stalks. Leaf-stalks hairy, somewhat prickly. Stem smooth. Stipulary prickles slightly hooked. Leaflets elliptic-lanceolate, acute, finely serrated; downy and glaucous beneath. Flowers corymbose.—In swamps, and on the banks of ponds, from New England to Virginia, flowering in June and July. Pursh says, "there are a great many varieties of this species." So little, however, have they been attended to, that five or six of those species which we have last described have, by Linnæus and others, been usually referred to *R. carolina*. The true *carolina* common in our shrubberies, flowering in June and July, is well distinguished by the above characters, first pointed out by the accurate and observing Ehrhart. This *shrub* is five or six feet high, bushy, but erect, with red, smooth, a little glaucous, twigs. Leaflets large, more copiously and minutely serrated than in *lucida*, n. 14, which this species, at first sight, most resembles; but they differ also from that in their glaucous and downy under side, as well as in having a fine taper point. The flowers are more numerous in each corymb, large, of a full crimson. The Pensylvanian Rose of the gardens, figured by Miss Lawrence, t. 68, and t. 66, differs in some respects from the common *carolina*. Its leaflets are more coarsely and sharply serrated; pale, but not glaucous nor downy, beneath. Flowers smaller and paler; in the double variety peculiarly beautiful, most of the outer petals being of a light flesh-colour, the central ones involute or tufted, of a rich crimson.

19. *R. rubifolia*. Bramble-leaved Rose. Ait. n. 12. Pursh n. 9.—"Fruit globose, rather hispid as well as the flower-stalks. Calyx unexpanded, pointless. Leaves ternate; downy beneath. Leaf-stalks glandular and prickly. Stem with somewhat hooked, stipulary and scattered, prickles, not hairy. Flowers corymbose."—Discovered in North America, by the late Mr. Francis Masson, who sent it to Kew in 1800. It is a hardy *shrub*, flowering in June and July, but has not yet fallen under our observation.

20. *R. villosa*. Apple Rose. Linn. Sp. Pl. 704. Willd. n. 12. Ait. n. 13. Fl. Brit. n. 3. Engl. Bot. t. 583. Lawr. Ros. t. 33, and t. 29. (*R. pomifera major*; Park. Parad. 418. f. 7.)—Fruit globose, bristly as well as the flower-stalks. Prickles of the stem nearly straight. Leaflets elliptic-oblong, downy on both sides. Segments of the calyx the length of the ripe fruit.—Native of mountainous woods and thickets, in the north of Europe. Plentiful in Westmoreland, Cumberland, and the north of Yorkshire, flowering in June. It is often cultivated in shrubberies for the sake of the beauty of its large scarlet bristly fruit, above an inch in diameter. The double-flowered variety, when luxuriant, is one of our handsomest flowering shrubs. Miss Lawrence's figures of this species are not happy. The bush is from four to six feet high, with strong, straight, scattered prickles. Leaflets five or seven, large, of a peculiar elliptic-oblong shape, somewhat rounded at the end, doubly serrated and glandular at the edges, finely downy and hoary on both sides, aromatic or pungent, in some degree, when rubbed. Flowers one or two at the end of each branch, lightly scented, of a fine pale pink. Fruit at every period armed with strong thorns, and crowned when ripe with the hispid, involute, twisted calyx, which then hardly exceeds it in length.

21. *R. mollis*. Soft-leaved Round-fruited Rose. Sm. Engl. Bot. t. 2459. (*R. villosa* β ; Fl. Brit. 538. Relh. Cant. 193. *R. sylvestris*, folio molliter hirsuto, fructu rotundo glabro, calyce et pediculo hispidis; Dill. in Raii Syn. 478.)—Fruit globose, half as long as the segments of the calyx, bristly as well as the flower-stalks. Prickles of the stem straight. Leaflets elliptic-ovate, downy on both sides.—Native of bushy places, in England, Scotland, and Wales, flowering in June or July. A much more humble shrub than the *villosa*; the leaflets less oblong, and more ovate; petals of a deeper red; ripe fruit much smaller, purplish, not scarlet, its length or diameter not above half the length of the permanent calyx, one segment of which, and no more, is often very distinctly pinnated. The Rev. H. Davies has found the fruit variable in Anglesea, from perfect smoothness, as mentioned by Dillenius, to every degree of roughness. The prickles of the stem vary in size, and are frequently hooked.

22. *R. glutinosa*. Clammy Cretan Rose. Sm. Prodr. Fl. Græc. Sibth. v. 1. 348. Fl. Græc. t. 482, unpublished. (*R. cretica montana*, foliis subrotundis glutinosis et villosis; Tourn. Cor. 43. *R. pumila alpina*, pimpinellæ exactè foliis imparis, spinis incurvis, aquare purpurea; Cupan. Panphyt. ed. 1. v. 1. t. 61.)—Fruit globose, hispid as well as the flower-stalks. Prickles of the stem copious, hooked. Leaflets roundish; downy and glandular on both sides.—Native of the Sphaciote mountains of Crete, and, from Cupan's synonym, of the mountains of Sicily. By a specimen sent to Linnæus, the plant seems to have been cultivated in the French gardens, but we know it not in England. The stem is low, bushy, with numerous stout branches, armed with many, scattered, strong, hooked prickles. Leaflets seven, roundish and obtuse, strongly and

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often doubly ferrated; downy, somewhat hoary, glandular and viscid on both sides, as are also the *leaf-stalks*. *Flowers* small, pale-blush, terminal, solitary, on short, brittle, viscid *stalks*. *Fruit* globose, scarlet, covered with rigid glandular-pointed bristles, its diameter full half an inch, which nearly equals the length of the permanent, upright, converging, hispid *calyx*.

23. *R. hibernica*. Irish Rose. Sm. Engl. Bot. t. 2196. Ait. n. 14.—Fruit nearly globose, smooth as well as the flower-stalks. Prickles of the stem slightly hooked. Leaflets elliptical, smooth; their ribs hairy beneath.—Discovered by John Templeton, esq. in the county of Down, about Belfast harbour, where it grows abundantly, flowering from the early part of June, till the middle of November. The discoverer thus became entitled to the liberal premium of fifty pounds, offered by the patrons of botany at Dublin, for the detection of any new Irish plant. The above characters readily distinguish this species, from every other described rose. The *stem* is six feet high, erect, much branched, and very prickly. *Leaflets* broadly ovate, deeply and acutely ferrated, smooth, except the back of their ribs and veins, which are hairy. Sometimes a few coarse hairs occur on the upper surface. *Flower-stalks* often solitary, sometimes two or three together. *Petals* pale blush-coloured. *Fruit* scarlet, smooth, accurately globose when young, but in ripening sometimes elongated at the summit, so as to become slightly ovate.

This is not the only new Irish Rose that has been discovered of late; Dr. Taylor having favoured us with incomplete specimens of what will certainly prove two or three others, hitherto nondescript; one of them with remarkably large, twin, hooked, stipular *prickles*, unlike any other species with which we are acquainted.

24. *R. sinica*. Three-leaved Chinese Rose. Linn. Syst. Veg. ed. 13, 394. Ait. n. 15.—“Fruit nearly globose, smooth. Flower-stalks prickly, hispid. Stem and leaf-stalks prickly. Segments of the calyx lanceolate, somewhat stalked.”—Native of China. Cultivated by Miller in 1759. A hardy shrub, flowering from May to July. *Aiton*. We adopt this entirely on the authority of the *Hortus Kewensis*, having never seen the garden plant; nor have we any authentic specimen to prove what *R. sinica* of Linnaeus really is; he having mentioned it only, under the above characters, in his *Systema Vegetabilium*. There occurs in his herbarium, a specimen from the Upsal garden, marked *China*, which answers to the above characters; especially in the paradoxical account of the stalked leaves, or segments of the *calyx*, they being here in a deformed or monstrous state. But the leaflets are five, not three, as Mr. Aiton’s English name implies; and the very young *fruit*, though “nearly globose,” has all the appearance of being truly oval when perfectly formed. Indeed we believe this specimen to be not essentially different from *R. indica*, the Pale China Rose, now so common in gardens.

25. *R. rugosa*. Rugose Japan Rose. Thunb. Jap. 213. Willd. n. 13.—“Fruit globose, smooth. Flower-stalks, leaf-stalks, and stem prickly. Leaflets obtuse with a point, rugose, downy beneath.”—Native of Miaco in Japan, flowering in May and June, and known by the name of *Ramanas*.—*Stem* shrubby. *Branches* somewhat downy, armed with larger and smaller, very dense, spreading, white prickles. *Leaflets* nine, an inch long, ovate, blunt, with a point, ferrated; green and rugose above; downy, veiny and rugose beneath; their *common stalk* downy, beset with scattered, spreading, white prickles. *Flowers* solitary, on downy *stalks*, furnished also with copious, very slender, spreading, white prickles. *Calyx* downy within; hairy

without. Young *fruit* globose, destitute of prickles or pubescence. *Thunberg*.

26. *R. provincialis*. Provins Rose. Mill. Dict. ed. 8. n. 18. Ait. Hort. Kew. ed. 1. n. 11. ed. 2. n. 16. Willd. n. 14. Lawr. Ros. t. 8. t. 22. t. 1. t. 4. t. 43. t. 21.

β. *R. muscosa*; Ait. n. 25. Willd. n. 22. Curt. Mag. t. 69. Lawr. Ros. t. 14. (*R. rubra plena spinosissima*, pedunculo muscoso; Mill. Ic. 148. t. 221. f. 1. *R. provincialis spinosissima*, pedunculo muscoso; Hort. Angl. 66. t. 18.)

γ. Leaves and flowers much smaller. Rose de Meaux, &c.; Lawr. Ros. t. 31. t. 50. t. 71. Curt. Mag. t. 407. To which are most akin Lawr. Ros. t. 88 and t. 76; mere evanescent varieties.

Fruit roundish. Flower-stalks and leaf-stalks hispid. Prickles of the branches scattered, somewhat hooked. Leaflets roundish-ovate; hairy beneath; with glandular ferratures.—Native of the south of Europe; at least it is so considered; though a plant too generally cultivated for any thing to be averred on this subject. With us it is hardy, flowering in June and July. Most of the varieties are increased by roots or layers, and remain tolerably distinct; the different forms of variety γ are least permanent. *Stems* usually three or four feet high, straight, very prickly. *Leaflets* five, of a rounded bluntish figure, veiny and rugose. *Stipulas* linear-lanceolate, acute, undivided; most entire in their lower part. *Flowers* two or three, or more, at the top of each branch, large, delightfully fragrant, of that peculiar bright crimson hue popularly termed a rose-colour, with broad brown stains on the backs of the outer *petals*, which are permanent in the otherwise white variety, represented in Miss Lawrence’s t. 4. In all our cultivated varieties the *flowers* are double, with slight remains of *stamens* or *styles*; so that the *fruit* never ripens. We have however seen, in the ample collection of roses at Messrs. Lee and Kennedy’s, perfectly single *flowers* of the Moss Rose, which those experienced cultivators have proved to be only a variety of the Common Provins Rose. Indeed we have been told in Italy, that this variety loses its mossiness, almost immediately, in that climate.

27. *R. serox*. Hedge-hog Rose. Ait. n. 17. Lawr. Ros. t. 42.—Fruit globose, hispid. Leaflets elliptic-oblong, rugose, four pair with an odd one. Stem, leaf-stalks, and young branches, very densely spinous.—Native of mount Caucasus. Introduced about 1796, by Lee and Kennedy. Hardy, flowering from June to August.—A stout bushy *shrub*, very remarkable for its copious, long, straight prickles. The *leaflets* are recurved, convex, and rugose, of a glaucous hue. *Flowers* large, crimson, on short stalks.

Section 2. *Fruit ovate, or oblong.*

28. *R. gallica*. Red Official Rose. Linn. Sp. Pl. 704. Willd. n. 16. Ait. n. 19. Ehrh. Off. 324. Woodv. Med. Bot. t. 141. Lawr. Ros. t. 16. t. 13. t. 57. t. 7. and t. 49. (*R. rubra*; Ger. Em. 1261. Bauh. Pin. 481. Rosa; Matth. Valgr. v. 1. 168. *R. milefia rubra*, flore simplici; Hort. Eyft. vern. ord. 6. t. 6. f. 3. *R. prænestina variegata*; ibid. t. 2. f. 2. Mill. Ic. 148. t. 221. f. 2.)

β. *R. centifolia*. Linn. Sp. Pl. 704. Willd. n. 15. Ait. n. 18. Lawr. Ros. t. 11. t. 40. t. 85. t. 44. t. 51. t. 2. t. 35. t. 46. t. 67. t. 20. t. 59. t. 47. t. 55. t. 39. t. 73. t. 82. t. 87. t. 79. t. 89. (*R. centifolia rubra*; Hort. Eyft. vern. ord. 6. t. 2. f. 1. *R. hollandica*, five batava; Ger. Em. 1262.)

Fruit ovate, hispid as well as the flower-stalks. Stem hispid

hispid and finely prickly. Leaflets ovate; hairy beneath. Calyx half-pinnate.—Native of the southern parts of Europe. This, in its nearly single state, is the Rose always used medicinally, for conserve, tincture, &c. on account of the richer colour, and more astringent quality, of its petals. Its numerous varieties are common in gardens throughout Europe, blooming in June and July. We perfectly agree with our friend Mr. Lee of Hammer-smith, that the *R. centifolia* of authors, of which so many trifling varieties are indicated above, is itself merely a variety of the *gallica*. This a comparison of their *leaves* will readily prove. The roughness of their *leaf-stalks* is undoubtedly variable. *R. gallica* in its natural state, as it is said to be in the south of France, and as we see it usually in country gardens and shrubberies, is scarcely three feet high, throwing up, from its creeping *roots*, many *stems*, armed with fine, dispersed, and not numerous, straight, short *prickles*. *Leaflets* five, large, ovate, doubly serrated, overlapping each other at their heart-shaped base; the under side pale, downy or hairy, often whitish; the upper smooth, of a fine, rather shining, green. *Stipulas* linear-lanceolate, pointed, entire, downy and glandular. *Flowers* of a few large spreading *petals*, whose colour is a peculiarly rich and deep crimson, their base, like the *stamens*, of a fine golden yellow. Segments of the *calyx* downy, broad at the base, some of them fringed at the keel or margin, with a row of linear-lanceolate leaflets, as if pinnate. *Fruit* globular, pale scarlet, becoming nearly smooth as it ripens. The red and white parti-coloured variety, or *Rosa mundi*, Miss Lawrence's t. 13, differs only in colour. This is often termed the York and Lancaster Rose. The Giant Rose, her t. 49, is gigantic in size and height, but paler in colour. The Velvet Rose, her t. 51 and t. 2, Hort. Angl. t. 18, is of so very dark a colour, at least those flowers which first expand, that some persons take the liberty of calling it black, and confirm the misnomer by a round assertion of its being produced by grafting on a black-currant bush. The innumerable varieties of the *centifolia* differ chiefly in the disposition of their richly multiplied, though diminished, *petals*, and are, many of them, very beautiful from their fullness, and precise neatness of figure; their colours are different shades of crimson, verging to pink, or to a blueish-purple.

29. *R. damascena*. Damask Rose. Mill. Dict. ed. 8. n. 15. Willd. n. 17. Ait. n. 20. Lob. Ic. v. 2. 206. Lawr. Ros. t. 38. t. 52. t. 10. t. 5. t. 17. t. 70. t. 58. t. 18. t. 83. t. 80, and t. 90.—*Fruit* ovate, turgid, hispid as well as the flower-stalks. *Stem* and leaf-stalks with hooked prickles. *Leaflets* ovate, pointed, hoary; villous beneath. *Calyx* half-pinnate.—Native of the south of Europe, and cultivated, time out of mind, in our gardens, flowering in June and July. The specific name seems to have originated with Lobel, and indicates that this species of Rose came from Damascus. Perhaps it may be what is reported to have been brought from Syria by a Comte de Brie, at his return from the crusades, of which the abbé Rozier speaks in his Cours complet d'Agriculture; though that author's description accords with the common *R. gallica*, and not with our *damascena*, and he calls it moreover *R. provincialis*. We have seen an extract only from his work, communicated by a learned friend, to whom we, as well as Mr. Aiton, are indebted for the more correct orthography of Provins, instead of Provence, Rose, for our n. 26. We cite Rozier to shew that some particular sort of Rose was brought from Syria to France; but whether it might be our *damascena*, or the *moschata* hereafter mentioned, which many old authors have termed *damascena*, and which is certainly an oriental Rose; we have not materials

even to form a conjecture. The Damask Rose is proverbially sweet, nor can any be more so than the species now under our consideration, which forms a bush four or five feet high. The *leaves* are distinguished, at first sight, by a hoary aspect, and more downy surface, than the *provincialis* or *gallica*, as well as by the longer, more pointed, shape of their *leaflets*. The prickles of the *stem* are broader, and hooked. *Flowers* more copious, with more slender and hoary *stalks*, as well as *calyx*. Their usual colour is a delicate uniform pink, verging rather towards purple than scarlet, and their fragrance is deliciously sweet as well as lasting. The name of York and Lancaster Rose, given to a very casual and transient variety of this, Lawr. t. 10, some of whose petals are white, others blush-coloured, appears much more suitable to the red and white *R. gallica*.

30. *R. sempervirens*. Evergreen Rose. Linn. Sp. Pl. 704. Willd. n. 18. Ait. n. 21. Sm. Prodr. Fl. Græc. Sibth. v. 1. 348. Fl. Græc. t. 483, unpublished. Lawr. Ros. t. 45. Clus. Exot. append. alt. Dill. Elth. 326. t. 246. (*R. moschata sempervirens*; Tourn. Inst. 637.)—*Fruit* ovate, hispid as well as the calyx and flower-stalks. *Stem* and leaf-stalks with hooked prickles. *Leaflets* ovate, pointed, smooth and shining. *Flowers* somewhat umbellate. *Bractæas* lanceolate, recurved.—Native of Germany, in hedges near Tubingen. *Roth*. Dr. Sibthorp found it very frequent in the hedges of Greece, and the neighbouring islands, and judiciously considered it as the genuine $\chi\rho\nu\sigma\sigma\beta\alpha\lambda\iota\sigma\nu$ of Dioscorides, with whose rather ample description it exactly agrees. The reader may see in John Bauhin's Hist. v. 2. 33, what uncertainty has enveloped this subject. This Rose has been cultivated about two hundred years, or perhaps longer, in England, being, on account of its singularly luxuriant and rapid growth, as well as the beauty of its shining evergreen *leaves*, very fit for covering tall buildings, as well as for making an impervious hedge or trellis. The *flowers* moreover are beautiful, sweet, of a delicate white, and plentiful whenever they appear at all, lasting through June, July, and August; but we have, like Clusius, found this shrub little disposed to blossom. Its general aspect, both in *leaf* and *flower*, is most like our wild *R. arvensis*, n. 8; but the ovate *fruit*, yellow when ripe, and the want of a glaucous hue about the *foliage*, *flower-stalks* or *buds*, are, among other things, sufficient marks of difference.

31. *R. levigata*. Climbing American Rose. Mich. Boreal-Amer. v. 1. 295. Pursh n. 10.—“*Fruit* ovate, very densely hispid. Segments of the calyx nearly entire. Prickles in pairs, recurved. Leaf-stalks slightly prickly. Leaflets lanceolate-oval, almost ribless, polished. Stipulas narrow, with awl-shaped points.”—Found in the shady woods of Georgia, North America, climbing to a great height. An evergreen shrub. *Leaflets* three or five. Tube of the *calyx* clothed with long and slender *spines*. *Pursh*, *Micbaux*.

32. *R. pumila*. Dwarf Austrian Rose. Clus. Hist. 117. Linn. Suppl. 262. Willd. n. 19. Ait. n. 22. Jacq. Austr. v. 2. 59. t. 108. (*R. austriaca*; Crantz Fasc. 2. 33.)—*Fruit* obovate, hispid as well as the flower-stalks. Leaf-stalks and stem with straightish prickles. *Leaflets* elliptical, glaucous beneath; their serratures glandular.—Common in Austria, on dry grassy hills, especially about woods and thickets, flowering in May and June. *Jacquin*. *Root* creeping. *Stems* twelve or eighteen inches high, erect, simple, or slightly branched, beset, in the upper part chiefly, with copious, small, slender, nearly straight prickles. *Leaflets* five, sometimes but three, drooping, of a roundish-elliptical shape, with double glandular serratures; smooth and green

green above; paler, glaucous, and sometimes downy, beneath. *Flowers* solitary, rather large, crimson; pale or whitish in the centre; very sweet-scented. Segments of the *calyx* partly pinnate, downy within and without. *Fruit* obovate, or pear-shaped, scarlet, more or less hispid, its pulp sweet and agreeable.—We are much inclined to refer this, as a variety, to *R. gallica*, n. 28; at least, if a more natural arrangement of the species were attempted, they ought to stand next to each other. Schleicher has found the *pumila* in Switzerland, nor can we doubt its being Haller's n. 1104, though Jacquin says the contrary, on the authority of a dried specimen, of what authority we know not. Haller, in his *Historia*, adopted his n. 1104 from other authors, nor did he there attempt a specific character; but in his *Nomenclator*, he has given one which precisely answers to Jacquin's plant.

33. *R. turbinata*. Frankfort Rose. Ait. ed. 1. n. 17. ed. 2. n. 23. Willd. n. 20. Lawr. Ros. t. 69, marked 63. (*R. campanulata*; Ehrh. Beitr. v. 6. 97. *R. inapertis floribus*, alabastro crassiore, francofurtensis quibusdam; Tourn. Inst. 639. *R. francofurtensis*; Park. Parad. 414. t. 415. f. 3.)—*Fruit* turbinate, hairy as well as the flower-stalks. *Leaf-stalks* and leaflets villous. Prickles scattered, hooked.—The native country of this Rose is not known; but the shrub has been cultivated in gardens, ever since the days of Parkinson, from June to August. There is an appearance of monstrosity about the *calyx*, whose tube is bell-shaped, thick, and dilated at the top; the segments however are, most of them, quite simple and entire. *Petals* large, crimson. *Leaves* broad, villous.

34. *R. rubiginosa*. Common Sweet-briar, or Eglantine. Linn. Mant. 2. 564. Willd. n. 21. Ait. n. 24. Fl. Brit. n. 5. Engl. Bot. t. 991. Jacq. Austr. t. 50. Ehrh. Beitr. v. 4. 22. Arb. 75. Lawr. Ros. t. 56. t. 65. t. 72. t. 41. t. 61. t. 74. (*R. eglanteria*; Herm. Ros. 17. Hudf. Angl. 218. *R. suavifolia*; Lightf. Scot. 262. Fl. Dan. t. 870. *R. sylvestris odora*; Ger. Em. 1269. f. 1. R. n. 1103; Hall. Hist. v. 2. 39.)—*Fruit* obovate, bristly as well as the flower-stalks. Prickles of the stem and leaf-stalks hooked. Leaflets elliptical, clothed beneath with rusty-coloured glands.—Native of dry sunny banks in various parts of Europe, flowering in June and July; truly wild in many places in England, where the soil is gravelly or sandy, sometimes even in wet situations about rivers. The stem is bushy, much branched, about a yard high, with copious, broad, strongly hooked prickles, of a pale brown, all over its green branches. Leaflets five or seven, of a roundish, elliptical figure, with strong, double, glandular serratures; its upper surface bright green, slightly hairy; the under clothed with reddish viscid glands, the seat of a delightful fragrance, which renders the plant acceptable to most people, though often compared to the scent of apples, which many persons dislike. *Flowers* also sweet-scented, of a full and uniform pink: occasionally double, and sometimes pale or whitish, as represented in some of Miss Lawrance's plates. *Fruit* scarlet, more or less obovate, bristly, often nearly smooth; internally mealy and insipid. This well-known shrub makes beautiful and fragrant, though not long-lived, hedges. It bears forcing well, and hence is generally introduced, in winter or spring, into the apartments of those who delight in such innocent luxuries. Care should be taken to obtain the true sort, and not the following species.

35. *R. micrantha*. Small-flowered Sweet-briar. Sm. Engl. Bot. t. 2490.—*Fruit* ovate, somewhat bristly, as well as the flower-stalks. Stem straggling, with scattered hooked prickles. Leaflets ovate, acute, clothed beneath with rusty-coloured glands.—Mr. W. Borrer finds this

species of Rose common in hedges and thickets, in England, flowering about June and July. We have also met with it in gardens, confounded with the genuine Sweet-briar, from which it differs as follows. The stem is less prickly, less bushy, and of a more elevated and straggling form of growth, like *R. canina*. Leaflets less rounded, less rusty beneath, and not so fragrant as those of *rubiginosa*. *Flowers* paler, and smaller, being less than those of any other British Rose. *Fruit* ovate, with a more gradual neck, not obovate or pear-shaped. It varies in roughness. *Footstalks*, and backs of the leaves, downy as well as glandular.

36. *R. suaveolens*. American Sweet-briar. Pursh n. 11. ("R. eglanteria americana; Andrews's Roses, with a figure.")—*Fruit* ovate. Flower-stalks, and prickly leaf-stalks, rough with glandular bristles. Stem smooth; its prickles long, slender, slightly curved. Leaflets roundish-elliptical; downy above; somewhat glandular beneath.—Native of North America. We received specimens from Pennsylvania, gathered by the Rev. Dr. Muhlenberg. Linnæus cultivated this species at Upfal, and has preserved a branch, without name or description, in his herbarium. The plant differs from both the foregoing, in its long, slender, slightly curved, but by no means hooked, prickles, which often stand, two together, near, or close to, the base of the leaf-stalks. The leaflets are of a broad roundish form; finely hairy above; loosely besprinkled with stalked glands, though not rusty, beneath. *Flowers* pink, small, often, but not always, solitary, nor are the segments of the *calyx*, as Mr. Pursh describes them, always simple or entire; some of them are pinnate. *Fruit* smooth, or somewhat prickly.

37. *R. scabriuscula*. Roughish-leaved Dog Rose. Sm. Engl. Bot. t. 1896. (R. n. 459; Winch Guide, v. 1. 48. v. 2. preface, 5.)—*Fruit* roundish-ovate, bristly as well as the flower-stalks. Prickles awl-shaped, nearly straight. Leaflets elliptical, roughish with minute hairs.—Native of hedges in Durham and Northumberland, as well as on the north side of Bury in Suffolk, flowering in June.—This Rose has a general resemblance to *canina* and *tomentosa*, hereafter described; but its pubescence is hairy, more of the nature of the two or three last, as are also the glandular serratures of the leaves. There is a harshness about them, very unlike the *tomentosa*, nor have they any greyish hoary hue. Their scent is scarcely any. The stem is tall, with copious, scattered, nearly straight, and rather slender, brown prickles. Leaf-stalks hairy, prickly, and clothed with glandular bristles. Leaflets elliptical, pointed, doubly and sharply serrated, of a light bright green; finely hairy all over their upper surface, but most so on the rib and veins beneath. Flower-stalks and young fruit beset with strong glandular bristles. *Calyx* partly pinnate; downy within; glandular and bristly at the outside. *Petals* moderately large; Mr. Winch finds them always white, tinged or blotched with red; in Suffolk they are mostly of a pale pink. *Fruit* large, red, inclining to a globular figure.

38. *R. cæsia*. Glaucous-leaved Dog Rose. Sm. Engl. Bot. t. 2367. (*R. canina pubescens*; Afzel. in Sims and Kon. Ann. of Bot. v. 2. 211.)—*Fruit* roundish-ovate, smooth. Prickles of the stem hooked. Leaflets ovate, pointed, doubly serrated, downy; very glaucous as well as the germen and young branches.—Found by Dr. Adam Afzelius in Sweden, and by Mr. W. Borrer in the highland valleys of Perthshire and Argyleshire, flowering profusely in July. Mr. Borrer describes the bush as "compact, not so tall as the *canina*. *Flowers* usually solitary; sometimes in pairs, generally of an uniform, but very beautiful, carnation hue; occasionally white. *Calyx* sometimes sprinkled with glands, sometimes not. Young twigs, leaves and ger-

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men remarkably caſious." His ſpecimens accord precifely with thoſe ſent by Dr. Afzelius. The very glaucous leaves, clothed on both ſides with fine hairy pubeſcence, eſſentially diſtinguiſhes this plant from *canina*, under which ſo many diſtinct ſpecies have been negligently confounded, by moſt botaniſts, till within a few years paſt. The fruit has been obſerved by Dr. Swartz to vary ſomewhat in form, being occaſionally oblong, obovate, or nearly globoſe: in a young ſtate it is glaucous and blueiſh; always ſmooth. *Calyx* partly pinnate.

39. *R. tomentofa*. Downy-leaved Dog Roſe. Fl. Brit. n. 4. Engl. Bot. t. 990. Ait. n. 31. (*R. villoſa*; Ehrh. Arb. 45. Villars Dauph. v. 3. 551. *R. fylveſtris alba*, cum aliquo rubore, folio hiſfuto; Bauh. Hiſt. v. 2. 44.)—Fruit ovate, briſtly as well as the flower-ſtalks. Prickles of the ſtem hooked. Leaflets ovate, downy on both ſides.—Native of woods, hedges, and thickets, in various parts of England, flowering in June and July. It is alſo found in Germany and Dauphiny. The ſtem is buſhy, and moderately tall. Prickles hooked, generally placed under the inſertion of each leaf-ſtalk, either ſolitary or in pairs. Leaflets five or ſeven, ovate, acute, with fine double glandular ferratures, of a grey hoary green, denſely clothed on both ſides with ſoft pubeſcence, and, when rubbed, exhaling a ſlight acceſcent fragrance, moſt like the ſmell of *R. villoſa*, n. 20. *Calyx* pinnate, in the manner deſcribed in the generic character, clothed externally with glandular bristles. Fruit in every ſtate, more or leſs briſtly, though ſometimes nearly ſmooth, while the flower-ſtalks are always very briſtly; its colour when ripe is a tawny ſcarlet. Petals almoſt white towards their baſe, otherwiſe elegantly roſe-coloured, and a little fragrant. Specimens from Ehrhart and Villars have determined their ſynonyms; though the latter, at leaſt, by his deſcription, has apparently confounded the true *villoſa* with our *tomentofa*. So little were Roſes underſtood or conſidered at one time, that we recollect many grave debates among the Norwich botaniſts, about thirty years ago, whether this moſt diſtinct ſpecies were different or not from the common *canina*!

40. *R. canina*. Common Dog Roſe, Wild Briar, or Hep-tree. Linn. Sp. Pl. 704. Willd. n. 31. Ait. n. 30. Fl. Brit. n. 6. Engl. Bot. t. 992. Curt. Lond. fac. 5. t. 34. Woodv. Med. Bot. t. 139. Fl. Dan. t. 555. Lawr. Roſ. t. 81. t. 60. Ehrh. Arb. 55. (*R. n. 1101*; Hall. Hiſt. v. 2. 38.)—Fruit ovate, ſmooth as well as the flower-ſtalks. Prickles of the ſtem ſcattered, hooked. Leaflets ovate, pointed, very ſmooth, unequally ferrated.—Very common in hedges and thickets in Britain, as well as throughout Europe, flowering in June. Few plants contribute ſo much to the ornament of the country, for it is certainly the moſt elegant of our Roſes; the ſcent of its flowers, and the flavour of its fruit, are both peculiarly grateful. The latter, when mellowed by froſt, affords a moſt agreeable conſerve, kept in the apothecaries' ſhops. The ſtem is often ſix or ſeven feet high, erect and ſtraggling, with irregularly diſperſed, pale brown, broad prickles. Leaflets uſually ſeven, of a dark ſhining myrtle-like green; paler, or glaucous in ſome degree, underneath; with numerous, ſharp, unequal, not glandular, ferratures. Leaf-ſtalks ſmooth, armed with a few hooked prickles. Flower-ſtalks terminal, naked and very ſmooth, often ſolitary, ſometimes two, three, or four in a kind of umbel. *Calyx* downy, ſcarcely ever glandular. Fruit oblong-ovate, of a coral red, almoſt always quite ſmooth.

41. *R. collina*. Rough-ſtalked Dog Roſe. Jacq. Auſtr. v. 2. 58. t. 197. Willd. n. 32. Ait. n. 32. Engl. Bot. t. 1895.—Fruit ovate, ſmooth. Flower-ſtalks briſtly, cluſ-

tered. Prickles of the ſtem ſcattered, hooked. Leaflets ovate, downy beneath, ſimply ferrated. Leaf-ſtalks downy.—Gathered by Jacquin on hills in Auſtria. Mr. W. Borrer finds it common in Suffex, flowering in July, and ripening fruit in October.—Its habit and general aſpect are like the *canina*. The prickles are diſperſed, hooked. Leaflets uſually ſeven, variable in length and roundneſs, ſimply, and tolerably equally, ferrated; always downy, or finely hairy, beneath, eſpecially the rib; ſometimes ſlightly ſo above. They have no ſcent, and are thicker, as well as leſs ſhining, than thoſe of *canina*. Leaf-ſtalks downy and prickly. Flowers pale pink, fragrant, commonly two or three together, on ſtalks covered with glandular bristles. Fruit in every ſtate ovate and ſmooth, except now and then a ſtraggling bristle or two; ſcarlet when ripe, and ſaid not to be diſtinguiſhable from *canina*. We have never taſted it. The ſtyles, after flowering, are combined and elongated, as in *R. arvenſis*.

42. *R. dumetorum*. Downy-ſtalked Dog Roſe. "Perſ. Syn. part 2. ſect. 1. 50?" Engl. Bot. t. 2579.—Fruit ovate, ſmooth. Flower-ſtalks villous, ſomewhat briſtly, cluſtered. Prickles of the ſtem hooked, rather aggregate. Leaflets ovate, doubly ferrated; ſlightly hairy beneath. Leaf-ſtalks very downy.—Gathered by Mr. W. Borrer, in buſhy places in Suffex, flowering in July, and ripening fruit in October. We believe it alſo to have been found in Switzerland, near Orbe, by the late Mr. Davall, and there is a ſpecimen, without name, or any mark, in the Linnæan herbarium. The ſynonym of Perfoon was ſuggeſted by Mr. Borrer, nor have we any further authority for its application. The habit of the ſhrub is more robuſt than *R. canina*, with very ſtrong hooked prickles, uſually placed in pairs under each footſtalk, and ſometimes three or more together under the lateral branches. It differs alſo from that ſpecies in having very downy footſtalks; leaflets rounder and flatter, doubly ferrated, their ribs and veins hairy beneath; the flower-ſtalks either villous and briſtly, or only villous, with ſoft, ſpreading, permanent hairs; rarely ſmooth. Theſe hairs, and the double ferratures, diſtinguiſh it from *collina*, with which its downy leaf-ſtalks agree. The flowers are ſmaller and paler than in either of thoſe ſpecies. The ſtyles accord with *canina*, not with thoſe of *collina*.

43. *R. moschata*. Muſk, or Cluster, Roſe. Mill. Diſt. ed. 8. n. 13. Willd. n. 23. Ait. n. 26. Deſfont. Atlant. v. 1. 400. Lawr. Roſ. t. 64. t. 53. Jacq. Hort. Schoenbr. v. 3. 16. t. 280. Ger. Em. 1265. f. 1 and 2. (*R. moschata* minor, flore ſimplici; Bauh. Hiſt. v. 2. 45; and flore pleno; ibid. 47.)—Fruit ovate, villous when young, as well as the flower-ſtalks. Stem and leaf-ſtalks prickly. Leaflets oblong, pointed, ſmooth. Panicles many-flowered, downy as well as the calyx.—Deſfontaines found this elegant and fragrant Roſe growing every where in the hedges of Barbary. It is cultivated by the inhabitants of Tunis, who obtain from its petals, by diſtillation, a very fragrant eſſential oil; the ſame, if we miſtake not, which in the Eaſt Indies is called *Ottar*. The ſhrub is common in our gardens, and has been ſo from Gerarde's time, flowering from July to October. The ſemidouble kind moſt uſually occurs. The ſtems are long and lax, ſmooth, beſet with ſcattered, ſhort, hooked prickles. Leaves of a light, ſlightly glaucous green, eſpecially beneath, ſmooth, except ſome downineſs on their footſtalks, and their ribs beneath. Stipulas ſmall, narrow, fringed with glands, and divaricated at the points. Flowers rather ſmall, white, exceedingly numerous, in large terminal panicles, whoſe ſtalks are ſlender, downy, deſtitute of prickles or glands, as is likewiſe the ſlender, downy, partly pinnate, calyx. Petals with ſlender claws. Fruit ſmall, ſmooth, orange-coloured.—*R. moschata* major, Bauh. Hiſt.

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v. 2. 45. Lob. Ic. v. 2. 208, quoted by Miller incautiously for this, may be *R. damascena*.

44. *R. rubrifolia*. Red-leaved Rose. Villars Dauph. v. 3. 549. Willd. n. 24. Bellardi Append. ad Fl. Pedem. 23. t. 4. (Rosier multiflore; Reynier Mem. de la Suisse, v. 1. 22.—Fruit roundish-ovate, smooth as well as the flower-stalks. Prickles of the stem and leaf-stalks hooked. Leaflets ovate, smooth, coloured, simply ferrated. Flowers corymbose, with sheathing dilated bractæas and stipulas.—Native of the mountains of Switzerland, Dauphiny, and Savoy; a stranger to our gardens. The whole plant, branches, leaves, stalks, and tube of the calyx, are more or less tinged with a vinous red. The stem is erect and robust, ten to fifteen feet high, armed with scattered, distant, recurved prickles. Leaflets seven or nine, large, broadly ovate, with strong sharp ferratures, smooth on both sides, with numerous, parallel, red veins. Stipulas red, smooth; the upper ones, near the flowers, much dilated, and replaced immediately by similar, but smaller, bractæas. Flowers from three to five, of a fine pink, forming a short smooth corymb. Segments of the calyx almost entirely simple, very long and slender, downy within, slightly glandular at the edges, each terminating in a long, lanceolate, leafy point. Fruit oval, small, smooth. Villars says the cultivated plant retains the peculiar red tints of its bark and foliage; only the size of the flowers is somewhat diminished.

45. *R. lagenaria*. Bottle-fruited Rose. Villars Dauph. v. 3. 553. Willd. n. 25.—Fruit obovate, beaked, smooth, pendulous. Stem without prickles. Leaf-stalks rather prickly. Flower-stalks downy, somewhat cymose. Leaflets elliptical, doubly ferrated, smooth as well as the calyx.—Native of France, in the district of Embrun, among the woods of Boscodon. Villars says he never met with this species elsewhere. He describes it as akin to the following, but differing in its large leafy calyx, and the greatly elongated spindle-shaped fruit, having a neck like that of a bottle. The stem is from three to five feet high, without thorns. Leaflets thin, obtuse. Flower-stalks three together, slightly downy, recurved. We have seen no specimen.

46. *R. alpina*. Alpine Rose. Linn. Sp. Pl. 703. Willd. n. 26. Ait. n. 27. Villars Dauph. v. 3. 552. Sm. Tour on the Cont. v. 3. 137. 140. Jacq. Austr. t. 279. Lawr. Ros. t. 30. (R. n. 1107; Hall. Hist. v. 2. 41.)—Fruit ovate, smooth. Stem without prickles. Leaf-stalks and flower-stalks bristly. Leaflets elliptic-oblong, doubly ferrated, smooth.—Very common in the alpine thickets of Switzerland, Savoy, Dauphiny, Austria, &c. flowering from June to August. It has long been cultivated in botanic gardens, but is not one of our popular species, being, though an elegant plant, and remarkable for the want of prickles, less striking than *R. pendulina*, which is also known by the name of "the Rose without a thorn." The present has smooth, spreading, sometimes procumbent, stems and branches, of a shining deep red, observed by Jacquin to be occasionally hairy or bristly, but never thorny. Leaflets seven or nine, elliptic-oblong, usually more than an inch in length, thin, smooth, doubly and sharply ferrated; paler beneath, with some hairs, now and then, on the midrib. Flowers generally solitary, of a rich and elegant rose-colour, on drooping, red stalks, clothed with glandular bristles. Calyx downy, with long, simple, slender, rather leafy-pointed segments; its tube generally smooth, though we have from M. Du Cros, a specimen with bristles on that part, as well as on the segments of the calyx. Fruit pendulous, oval, somewhat beaked, of a fine scarlet.—Miss Lawrance's t. 75 cannot possibly have any relationship to this species; see *Lucida*, n. 14.

47. *R. pyrenaica*. Pyrenæan Rose. Gouan. Illustr. 31. t. 19. Willd. n. 27.

β. *R. pimpinellifolia*; Villars Dauph. v. 3. 553. (*R. glandulosa*; Bellardi Append. ad Fl. Pedem. 24.)
Fruit ovate, hispid as well as the flower-stalks, and somewhat prickly leaf-stalks. Stem without prickles. Leaflets elliptical, doubly ferrated, smooth.—Native of vallies among the Pyrenæan mountains, as well as of Switzerland and Dauphiny. We are fully persuaded that the *R. pimpinellifolia* of Villars is, as he himself suggests, but a variety of Gouan's *pyrenaica*, nor can we trace out sufficient marks to describe it even as a variety. The glandular edging of the stipulas, on which our worthy friend Bellardi has founded its character and name, is no less evident and constant in *pyrenaica*, and even in *alpina* itself; of which last indeed we are strongly inclined to consider the supposed species, both of Gouan and Villars, as mere varieties, differing from the usual kind in their bristly calyx and fruit. The segments of the calyx are simple, with more or less leafy points in all, nor does Gouan mention any thing that affords a permanent mark of discrimination between *pyrenaica* and *alpina*.

48. *R. pendulina*. Smooth Pendulous Rose. Rose without a thorn. Linn. Sp. Pl. 705. Willd. n. 28. Ait. n. 28. Pursh n. 12. Ehrh. Arb. 105. Lawr. Ros. t. 9. (*R. sanguiforbæ majoris folio, fructu longo pendulo*; Dill. Elth. 325. t. 245. f. 317.)—Fruit ovate, elongated, smooth, pendulous. Stem and branches smooth, without prickles. Flower-stalks and leaf-stalks hispid. Leaflets elliptical, doubly ferrated, smooth, rather numerous. Segments of the calyx simple, naked and entire. Dillenius says this species was raised, in the Eltham garden, from New England seeds; but Mr. Pursh never met with it wild in any part of North America; and Ehrhart gives his specimen as a Swiss plant. We believe however that it is a North American, not an European shrub. In our gardens it blossoms towards the end of May, ripening fruit in August. The stem is five or six feet high, bushy, smooth, dark red, nor is there a prickle to be found on any part of the plant. Leaves bearing a considerable resemblance to those of the Greater Burnet, *Sanguiforba*, and composed of from nine to thirteen large, elliptical, smooth leaflets, paler beneath, with double glandular ferratures. Flowers solitary, crimson, on glandular, rather than bristly, stalks. Tube of the calyx oblong, very smooth; its segments quite simple, entire, narrow, downy at the edges, but destitute of dorsal prickles or glands. Fruit pendulous, scarlet, smooth and shining, remarkably elongated, beaked and curved, sufficiently discriminating the species, which nevertheless is nearly related to *R. alpina*, but in every part more robust.

49. *R. montana*. Round-leaved Mountain Rose. Villars Dauph. v. 3. 547. Willd. n. 29.—Fruit oval, bristly as well as the flower-stalks. Leaf-stalks prickly and glandular. Stem with hooked solitary prickles, below each leaf. Leaflets roundish, abrupt, doubly ferrated, smooth.—Native of hills in Dauphiny and Switzerland. A very distinct species, of which we have specimens from Mr. Schleicher. The stem is only two or three feet high, but strong, with many spreading, reddish, smooth branches. Prickles pale brown, moderately hooked or deflexed, awl-shaped, with a long linear base. They stand solitary, a little below each branch or leaf. Stipulas broad, fringed with glands. Leaf-stalks purplish, slightly prickly and glandular. Leaflets seven, somewhat glaucous, much resembling those of the Lesser Burnet, *Poterium*; their termination generally abrupt, and their ferratures coarse, scarcely glandular; the midrib now and then hairy beneath. Flower-stalks terminal, short, very bristly and glandular, either fo-

litory,

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itary, or two or three together, enveloped in the uppermost *stipulas*. *Petals* small, generally white, sometimes red. Segments of the *calyx*, bristly and glandular at the back, partly pinnate. *Fruit* red, armed with many strong bristles. This species has but a remote affinity to either *canina* or *arvensis*, with which Villars contrasts it, except that the *styles* are said to be elongated, after flowering, as in the latter.

50. *R. multiflora*. Bramble-flowered Chinese Rose. Thunb. Jap. 214. Willd. n. 30. Ait. n. 29. Curt. Mag. t. 1059. ("R. flava; Donn. Cant. ed. 4. 121.")—Fruit ovate, villous, unarmed. Flower-stalks villous, racemose. Stem and leaf-stalks prickly. Leaflets ovate, simply serrated; downy beneath.—Native of Japan and China. Introduced into this country by Thomas Evans, esq. of Stepney, about the year 1804. It is hardy, flowering in June and July, and a great acquisition to the gardens, being a shrub of luxuriant growth, easily trained to a considerable height. The leaves are of a greyish aspect; smooth above; paler and downy beneath; their serratures simple. Flowers in clusters, simple or compound, resembling those of the double-flowering Bramble, and not much larger. Thunberg describes them white; with us they are pink, with very numerous, small, imbricated petals, a few remains of stamens, and some elongated, dilated, greenish styles. The flowers, on the first introduction of the plant, were reported to be yellow, but we have not heard of any such variety having made its appearance.

51. *R. caucasica*. Caucasian Rose. "Marsch. Taurico-Caucas. v. 1. 400." Ait. n. 33.—"Fruit ovate, smooth as well as the flower-stalks. Leaf-stalks prickly. Stem not hairy; its prickles hooked. Leaflets doubly serrated, downy. Flowers umbellate."—Native of mount Caucasus, from whence it is said, in Hort. Kew., to have been brought to England about the year 1798. It is a hardy shrub, flowering in June and July. We have seen neither specimen nor figure. If the plant still exists in our collections, it ought to be delineated and given to the public.

52. *R. parvifolia*. Small-leaved, or Burgundy, Rose. Ehrh. Beitr. v. 6. 97. Willd. n. 33.—"Fruit ovate, nearly smooth. Flower-stalks glandular. Leaf-stalks and stem with minute straight prickles. Leaflets ovate, rugged; somewhat villous beneath; their serratures glandular." Said to be a native of Europe. A dwarf shrub. Leaflets five, small, ovate, acute. Flowers small. Willdenow. We know not what is intended under the above description, unless it be the Burgundy Rose, Miss Lawrance's t. 44, which we have, after the example of Hort. Kew. considered as a variety of *centifolia* or *gallica*, see n. 28. The characters answer, as far as any thing can be made out by the figure. We should have suspected the Rose de Meaux, Miss Lawrance's t. 31, might have been Ehrhart's and Willdenow's plant; but the latter has duly referred that, as we have done, to *provincialis* in its proper place, and having seen both in a living state, must be presumed to have distinguished them. There seems a great probability that the *parvifolia* in question is some garden variety of the *gallica*, to which its characters approach sufficiently near to authorize this opinion. We leave it for the final determination of those who may meet with authentic specimens.

53. *R. semperflorens*. Dark Chinese Rose. Curt. Mag. t. 284. Willd. n. 34. Ait. n. 34. Sm. Exot. Bot. v. 2. 63. t. 91. Lawr. Ros. t. 28. Jacq. Hort. Schoenbr. v. 3. 17. t. 281. (*R. diversifolia*; Venten. Jard. de Cels, t. 35.)—Fruit ovate, roughish. Stem, leaf-stalks, and flower-stalks, hispid or prickly. Prickles hooked. Leaflets three or five, ovate, smooth; paler beneath, with a hairy

rib. Calyx reflexed, entire.—Native of China, from whence it was introduced by the late Mr. Slater, about the year 1789. The shrub is perfectly uninjured by any of our frosts, and where the air is pure, grows luxuriantly in the open ground, flowering most part of the year. Yet it sometimes dies off unaccountably, and is not become so general an ornament of every cottage garden as the Pale Chinese Rose, hereafter mentioned, brought to England about the same period. The *semperflorens* is generally of humble growth, but in a rich loamy soil, on the outside of a greenhouse, may be trained to a considerable height. The stem is much and variously branched, armed with scattered, short, hooked prickles. Leaflets three or five, ovate, acute, rigid, unequally serrated; of a dark shining green, and smooth, above; paler, and rather glaucous, beneath, with a densely hairy rib. Leaf-stalks clothed with glandular bristles, and some soft hairs, as well as with a few hooked prickles. *Stipulas* linear, acute, fringed with stalked glands. Flower-stalks terminal, usually solitary, rough with glands or prickles, single-flowered. Segments of the *calyx* reflexed, lanceolate, coloured, simple and entire, downy, more or less fringed or glandular at the edges. Petals deep crimson, sometimes very dark, tremulous from the slenderness of their claws; paler at the back. The figures in Ventenat, and our Exotic Botany, exhibit the flowers in a single state; the rest have double flowers, as usually seen in gardens. Jacquin represents a supposed blush-coloured variety, which is probably *indica*, n. 55. The fruit is mostly roughish, at least when young; but sometimes quite smooth. We have not met with it ripe. The shrub is readily increased by cuttings.

54. *R. chinensis*. Slender Chinese Rose. Jacq. Obf. fasc. 3. 7. t. 55.—"Fruit ovate, smooth as well as the flower-stalks. Leaf-stalks and stem prickly. Leaflets usually three, ovato-lanceolate, finely serrated, smooth."—Native of China. Described by Jacquin from some specimens belonging to Gronovius. He speaks of the leaves as perfectly smooth and shining, and the segments of the *calyx* fringed with down. The leaves were mostly ternate, some of them only having a small additional leaflet at one side. This is very likely to be, as Willdenow suspected, the same species with our *semperflorens*. If it should so prove, we hope the latter name, though of posterior date, will not be sacrificed to one so vague and indiscriminate as *chinensis*; especially as *semperflorens* is now established in systematic works of authority, and Jacquin himself, who, in his Hort. Schoenbr. considered these plants as the same, has liberally preferred it.

55. *R. indica*. Blush Chinese Rose. Linn. Sp. Pl. 705. Willd. n. 36. Ait. n. 35. (*R. semperflorens* β ; Lawr. Ros. t. 26. *R. longifolia*; Willd. n. 37.)—Fruit ovate, smooth. Flower-stalks bristly and glandular. Leaf-stalks glandular and prickly. Leaflets ovate, pointed, smooth; paler beneath. Prickles of the stem scattered, slightly hooked. Flowers somewhat corymbose. Calyx partly pinnate and leafy.—Native of China and the East Indies. Introduced by Sir J. Banks, about the year 1789, into the gardens of England, where it proves quite hardy, flowering profusely, almost throughout the year; and is undoubtedly one of the most desirable acquisitions, of the ornamental kind, that our collections have for a long time received. The shrub is of rapid and lofty growth, much stronger than *R. semperflorens*. Stem more or less armed with scattered, very strong, reddish, sharp, hooked or recurved prickles, which we have never found entirely wanting. Leaves of a full, bright, shining green on the upper side; paler, opaque, and a little glaucous, beneath; their leaflets for the more part five, ovate, taper-pointed, sharply and

pretty equally, but not strongly, serrated. *Leaf-stalks* bordered with glandular bristles, and furnished with a few hooked prickles. *Stipulas* linear, narrow, reticulated, fringed with red glandular bristles; their points acute, divaricated at right angles. *Flower-stalks* terminal, very numerous and corymbose in strong-growing plants; in ordinary ones fewer; in some solitary and single-flowered at the ends of weak lateral branches. They are always clothed with minute glandular bristles, even in the original specimen of Linnæus, which he described as smooth. Neither are the *leaves* of that specimen downy beneath. He seems to have taken that character from another, which he confounded therewith, but which we judge to be *moschata*, whose very young *leaves* bear a few hairs on their ribs and veins. *Flowers* moderately large, in a double state consisting of numerous, lax, disorderly *petals*, varying with every tint of pink or carnation, and having a sweet, though light, odour, as in *semperflorens*, but not exactly the same. The perfume of both is very inferior to most of our garden Roses, and even to the wild *R. canina*. The *calyx* of *R. indica* is variable in luxuriance, but always in some degree leafy, pinnate, or jagged. *Fruit* large, pale scarlet. On a careful comparison of Willdenow's *longifolia*, (sent by the Rev. Dr. Rottler, and by the late Dr. Koenig, from the East Indies,) with our garden plant, and the Linnæan specimen, we can have no doubt of their perfect identity; though the prickles of the *stem* seem wanting on the upper part, at least, of the luxuriant Indian specimens. Every one, who has attended to the cultivated *R. indica*, will be aware that this circumstance is of no importance, in the consideration of such materials as we have before us.

56. *R. bracteata*. Macartney Rose, or Sir George Staunton's Rose. Willd. n. 38. Ait. n. 36. Venten. Jard. de Cels, t. 28. Curt. Mag. t. 1377. (*R. lucida*; Lawr. Ros. t. 84.)—*Fruit* obovate. *Bractees* pectinated, concealing the flower-stalk, which is villous like the young branches. *Prickles* in pairs under the prickly leaf-stalks. *Leaflets* obovate, obtuse, crenate, smooth and shining. *Stipulas* deeply jagged. *Calyx* silky, taper-pointed.—Native of China, from whence it was brought by lord Macartney and sir G. Leonard Staunton, in 1795. It proves tolerably hardy in England, flowering from August to the end of autumn; but is often so much injured by exposure to our severe frosts, as seldom to recover sufficiently to blossom well in the ensuing summer. The *stem* is four or five feet high, downy, armed with a pair of deflexed reddish prickles under each *leaf-stalk*, and with innumerable minute straight ones over the whole surface. *Leaf-stalks* hairy, glandular, and prickly. *Leaflets* about seven or nine, rigid, shining, of a fine green; their ribs minutely prickly. *Stipulas* but little attached to the leaf-stalk, deeply cut, or pectinated, at one side. *Flowers* terminal, solitary, large, cream-coloured, agreeably scented, on short hairy *stalks*, which are concealed by several large, sheathing, deeply pectinate, or pinnatifid, *bractees*. *Calyx* coriaceous, taper-pointed, very silky externally. Ventenat mentions a small central point, in the sinus of each *petal*, which we do not find constant. The *stipulas*, and especially the *bractees*, are so peculiar, that this species can be confounded with no other.

57. *R. alba*. White Garden Rose. Linn. Sp. Pl. 705. Willd. n. 39. Ait. n. 37. Lawr. Ros. t. 37. t. 25. t. 23. t. 32. Ger. Em. 1260, with the same cut which Lobel uses for *R. damascena*.—*Fruit* ovate, smooth. *Flower-stalks* and *calyx* bristly. *Leaf-stalks* downy, armed like the stem with hooked prickles. *Leaflets* roundish-ovate, sharply serrated, downy beneath. *Calyx* partly pinnate.

—Native of Europe; in the hedges and thickets of Hesse and Saxony, according to Roth. Common in our gardens from the days of Gerarde, flowering in June and July. The bush is five or six feet high. *Leaves* dark green, of five or seven large, broad *leaflets*, sharply and copiously serrated, veiny; paler, and more or less downy, beneath. *Stipulas* paler, broad, dilated upwards, with glandular serratures, and obliquely spreading points. *Flowers* large, somewhat corymbose, pleasantly but weakly scented, usually pure white, but often tinged with a most delicate blush, as in Miss Lawrance's t. 23 and t. 32. Segments of the *calyx* partly bordered with long leafy appendages, glandular at the edges. *Bractees* like the *stipulas*, but more ovate. *Fruit* tawny, rarely perfected in gardens. We can give no good reason for placing the present species here, at a distance from *gallica*, n. 28, to which it is most naturally allied. No difficulty or confusion indeed can arise respecting a plant so well known, and so clearly defined. The White Rose was formerly an article of the *Materia Medica*, its distilled water, which possesses a slight astringency, being supposed good for inflammations and weaknesses of the eyes. A more fragrant water, equally colourless and efficacious, is distilled from the Provins rose, n. 26; which, we believe, is usually kept in the shops. In some of this, after long keeping, we have seen a floating oiliness, as deliciously and powerfully fragrant as the oriental otto of roses.

Our catalogue of species thus amounts to 18 more than Willdenow's, notwithstanding some retractions. The drawings of the Chinese afford reason to suppose we are not yet acquainted with all their species, and we have already hinted that some Irish ones are still waiting for more complete elucidation than they have hitherto received. The distribution of the species in general requires revision; nor have botanists sufficiently adverted to some characters, that appear to us more important than several they have depended upon. The number, and precise situation, of the stipular prickles, the form of the stipulas, and the structure of the calyx, appear to us more constant, than the absence or presence of glands, or of pubescence, in certain parts. The nature of the serratures of the leaves, whether simple or double, glandular or not, is likewise occasionally worthy of notice.

ROSA, in *Gardening*, contains plants of the deciduous flowering, shrub, and evergreen kind, of which the species cultivated are: the single yellow rose (*R. lutea*); the double yellow rose (*R. sulphurea*); the Hudson's-bay rose (*R. blanda*); the cinnamon rose (*R. cinnamomea*); the white dog rose (*R. arvensis*); the small burnet-leaved rose (*R. pimpinellifolia*); the Scotch rose (*R. spinosissima*); the small-flowered American rose (*R. parviflora*); the shining-leaved American rose (*R. lucida*); the Carolina rose (*R. carolina*); the apple rose (*R. villosa*); the Provence rose (*R. provincialis*); the hundred-leaved rose (*R. centifolia*); the red rose (*R. gallica*); the damask rose (*R. damascena*); the evergreen rose (*R. sempervirens*); the dwarf Austrian rose (*R. pumila*); the Frankfort rose (*R. turbinata*); the sweet-briar rose (*R. rubiginosa*); the moss Provence rose (*R. muscosa*); the musk rose (*R. moschata*); the Alpine rose (*R. alpina*); the deep red China rose (*R. semperflorens*); and the white rose (*R. alba*).

Of the first there is a variety termed the Austrian rose, which has the stalks, branches, and leaves, like those of the single yellow rose, but the leaves are rounder. The flowers are also larger; the petals have deep indentures at their points; are of a pale yellow on the outside, and of a reddish copper colour, orange scarlet, or barré colour within; are single, have no scent, or a disagreeable one, and soon fall away.

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away. It has sometimes flowers entirely yellow on one branch, and copper-coloured on another.

In the fourth species there is a double variety, in which the shoots are redder; the flowers small, short, thick, and double, of a pale red colour at the end of the leaves (petals), somewhat redder and brighter towards the middle. It is the smallest and earliest of the double garden roses, flowering in May.

In the seventh sort there are several varieties, as the striped-flowered, or with variegated flowers, red striped with white. The red Scotch rose, which seldom rises more than a foot high; the stalks are covered with a brown bark, and are closely armed with small spines; the leaves are very small; the flowers are also small, sessile, and of a livid red colour; the fruit is round, of a deep purple colour, inclining to black when ripe. And according to Withering, there is also a variety with prickly peduncles, and cream-coloured flowers, changing to white. Lawrance likewise mentions a double Scotch rose.

In the eighth kind there is a variety with a double flower.

Of the twelfth species there are several varieties, as the red Provence rose; the stem and branches are not so great as those of the other, but greener, the bark not being so red; the flowers are not so large, thick and double, but of a little deeper damask or blush colour, turning to red, but not coming near the full colour of the best red rose; nor is the scent so sweet as that of the damask Provence, but coming near that of the ordinary red rose. It is not so plentiful in bearing as the damask Provence. The blush Provence rose, in which the stalks rise from three to four feet high, and are unarmed; the leaves are hairy on their under side; the peduncles have some small spines; the segments of the calyx are semi-pinnate; the corolla has five or six rows of petals, which are large, and spread open; they are of a pale blush colour, and have a musky scent. The white Provence rose, which differs only in the colour of the flowers. The great and small dwarf Provence roses, called rose de Meaux, differ from each other in little except size; the smaller of the two is generally known by the nursery-men and gardeners by the name of Pomponne rose. It throws out numerous stems, which rarely exceed a foot, or a foot and half, in height; usually straight, rigid, and very prickly; the flowers very small, and distinguished by the brilliant colour of the central petals, appearing in June. All the sorts flower from July to August.

In the thirteenth species the varieties are very numerous; as the Dutch hundred-leaved rose; the blush hundred-leaved rose; the Singleton's hundred-leaved rose.

The single and double velvet rose, which, according to Parkinson, has the old stem covered with dark-coloured bark, but the young shoots of a sad green, with few or no thorns; the leaves are of a sadder green than in most roses, and very often seven on a stalk; the flower is single; or double, with two rows of petals, the outer larger, of a deep red, like crimson velvet; or more double, with sixteen petals or more in a flower, most of them equal: they have all less scent than the ordinary red rose. The Burgundy rose, which is an elegant little plant, not more than a foot or eighteen inches in height. The Sultan rose, the Stepney rose, the garnet rose, the bishop rose, and the Lisbon rose.

In the fourteenth sort there are several varieties; as the red officinal rose, the Mundi rose, which has the flowers very elegantly striped or variegated with red and white: in other circumstances it so perfectly resembles the red rose, that there can be no doubt of its being a variety of that;

indeed it frequently happens that a red rose or two appears on the same plant with the variegated flowers. The Childing rose, the marbled rose, and the double virgin rose, which have great affinity with each other, according to Miller.

Of the fifteenth sort there are also several varieties, as the red damask rose, the blush damask rose, which differ only in the shade and colour. The York and Lancaster rose, which agrees with the damask in stalk, leaf, &c. differing only in the flower being variegated with white stripes. Mr. Hart's rose has the white stripes more distinct; the flowers in these being less double than in several others, are frequently succeeded by fruit, and have ripe seeds, from which other varieties may be obtained. According to Parkinson, sometimes one half of the petal is of a pale whitish colour, and the other half of a paler damask than common; or one petal is white or striped with white, and the other half blush or striped with blush; sometimes also striped or spotted over, and at other times little or no stripes or marks, and the longer it remains blown open in the sun, the paler and the fewer stripes, marks, or spots will be seen in it. The smell is of a sweet damask rose scent. The red monthly rose, the white monthly rose, which are so called from their continuing to blow in succession during the greater part of the summer; not that they blow in every month, as the name implies. They are, in every respect, like the damask rose, unless it be that they are more full of prickles than that. The blush Belgic rose, which rises about three feet high, with prickly stalks; the leaves are composed of five or seven leaflets, which are oval, hairy on their under side; and slightly serrate; the peduncles and calyxes are large and semi-pinnate; the flowers very double, of a pale flesh colour, with little scent, generally in great quantities. The red Belgic rose, which differs only in having the colour of the flower a deep red. The great royal rose, and the imperial blush damask rose.

In the nineteenth sort the cultivated plant grows larger and more erect; the leaves are bigger and much sweeter than in the wild one, the rusty colour of them disappears, and the whole puts on a more vigorous appearance; the sweet scent is supposed to proceed from the gland. There are varieties with double flowers; as the common double sweet-briar, the mossy double sweet-briar, the evergreen double sweet-briar, the red double sweet-briar, the royal sweet-briar, and the yellow sweet-briar.

Of the twenty-first kind there is a variety with double flowers. And the editor of Miller's dictionary considers the evergreen musk rose of Miller to be the same with this.

Of the twenty-fourth sort, according to Parkinson, there are two varieties of the white garden rose; one attaining sometimes the height of eight or ten feet, with a stock of a great bigness, the other seldom higher than a damask rose. Both have somewhat smaller and whiter-green leaves than in many other roses, five most usually on a stalk, and paler underneath; as also a whiter-green bark, armed with short prickles. The flowers in the one are whitish, with an eye of blush, especially towards the bottom, very double, and for the most part not opening so fully as the red or damask rose. In the other more white, less double, and opening more. Some have only two or three rows of petals; and all have little or no smell.

Method of Culture.—In all the sorts the increase may be effected by suckers, layers, or by budding upon stocks of other sorts of roses; but this last method is only practised for some peculiar sorts, which do not grow well upon their own stocks, and send forth suckers sparingly. Where more

ROSA.

forts than one are to be had upon the same plant, such forts only should be budded upon the same stock as are nearly equal in their manner of growth, otherwise the strong one will draw all the nourishment from the weaker.

The suckers should be taken off in October, and planted out either in nursery-rows, or in the places where they are to remain; as where they are permitted to stand upon the roots of the old plants more than one year, they grow woody, and do not form so good roots as if planted out the first year. The best method to obtain good-rooted plants is to lay down the young branches in autumn, which will take good root by the autumn following; especially when watered in dry weather; when they may be taken off from the old plants, and be planted out where they are to remain. The feeds are sometimes sown in the autumn, to produce new varieties, in beds of light mellow earth, or in drills, especially for the common sweet-briar kinds, and for raising hedges of them.

But although new varieties and some particular permanent forts, such as continue the same by feeds, may occasionally be raised in this way; all the double kinds and peculiar varieties, are by no means, in general, to be produced in this manner, as they cannot be continued, with certainty, the same by feeds, but constantly require, in this intention, to be raised from layers or suckers.

The most proper season for planting all the forts is the autumn or winter, when the weather is mild and open, when they will, for the most part, flower in full perfection during the succeeding summer, but, should there be a necessity, they may be replanted out even so late as the beginning of the spring months without much danger. And it is often an useful practice to set out a few plants in this late manner for the sake of a late long continued blow in the autumnal season. In general, however, the sooner the work of planting them out is performed, the stronger and more fully will the plants afford their flowers.

In planting them out in the common or shrubby borders, it should mostly be done in a single manner; and they may be trained with single stems to the height of one, two, or more feet, and then managed so as to branch out into bushy heads; and it is commonly advisable to have them in this form; though some, for the sake of a more bushy growth, suffer them to branch away immediately from the bottom, as they will flower well in any mode of training.

Some, for curiosity, may also be run up with single stems to the height of from five or six to ten feet, and be kept in erect positions by means of proper supports, being made to form branchy heads at these heights, some running up more or less for the sake of greater variety. The large growing forts may likewise, in some cases, be planted out against walls, pales, &c. and be trained laterally as well as in an upright manner to some considerable extent.

Some plants of the early forts, as the monthly, &c. may also be set out in warm situations for more early blowing, and be treated in the same way.

But in the gardens about the metropolis, where large quantities of flowers of this kind are wanted for sale, the plants are generally set out in close rows, being put into the ground, in a sort of trench planting manner, at the distance of about a foot from each other, and afterwards kept down to the height of from not more than one to three feet, according to the forts and circumstances by cutting them over, or clipping them, every autumn or winter, at the top and on the sides, by which lateral branches are sent off in greater abundance for future flowering.

All good gardens should mostly be possessed of the dif-

ferent forts of these flowers, as they are easily procured, and multiply in an expeditious manner.

Some of the best forts of these plants may further also occasionally be put in pots for the purpose of being set out conveniently in different parts for the sake of ornament.

And where there are the conveniences of hot-houses and forcing-frames, it may, in many cases, be desirable and proper to place some of the prime forts in pots for the purpose of being forced in such places for an early blow by means of artificial heat. In this way they may be made to flower either in the winter or early spring months. In which intention some potted plants of the monthly, common, or moss Provence, or other choice forts of roses, must, in the winter, be set in the above sort of frame, wrought by dung, bark, or fire heat, or in a hot-house, which is by much the best, and be, by such means properly applied, forced into blow in the beginning of the new year and in succession for the two following months, and until the plants in the natural open ground begin to flower, different successional supplies of plants being so placed at the distance of every two or three weeks.

For this use a quantity of plants should, in general, be annually potted, which, if they have had a summer's growth in the pots, plunged in the ground, before they are employed in this way, it will be the better, as they will be more firmly rooted, and consequently blow in greater perfection and beauty. See FORCING, and FORCING-Frame.

It is not unusual for the gardeners in the vicinity of the metropolis to form conveniences of the above kinds in order to force flower-plants of this nature, as there is almost constantly a great demand and ready sale for them, at an early season, while they are in flower in the pots, as well as when the flowers are gathered in nosegays and other ways. They often pay extremely well in this manner of cultivating them.

Almost all the open ground forts delight in a rich moist soil and an open situation, in which they produce a greater quantity of flowers, and those much fairer, than when they are upon a dry soil, or in a shady situation. The pruning which they afterwards require, is only to cut out their dead wood, and take off all their suckers, which should be done every autumn; and if there are any very luxuriant branches, which draw the nourishment from the other parts of the plant, they should be taken out, or shortened, to cause them to produce more branches, if there be occasion for them to supply a vacancy; but it is best to avoid crowding them with branches, which is as injurious to these plants as to fruit-trees; for if the branches have not equal benefit from the sun and air, they will not produce their flowers so strong, or in so great plenty, as when they are more open, and better exposed to the sun, so as to have a more free circulation of air. As the moss Provence rose seldom sends out suckers, and does not strike very freely by layers, it is often increased by budding it upon stocks of the other forts; but the plants are best when raised from layers.

In general the best fort for flowering early and late is the monthly, next to which in flowering in the open air is the cinnamon, which is immediately followed by the damask rose, then the blush, York, and Lancaster; after which, the Provence, Dutch hundred-leaved, white, and most other forts; and the latest forts are the Virginian and musk roses, which, if planted in a shady situation, seldom flower until September, and if the autumn proves mild, continue often till the middle of October. And the plants of the two forts of musk roses should be placed against a wall, pale, or other building, that their branches may be supported, otherwise they are so slender and weak as to trail upon

upon the ground. These plants should not be pruned until spring, because their branches are somewhat tender; so that when they are cut in winter, they often die after the knife; these produce their flowers at the extremity of the same year's shoots in large bunches, so that their branches must not be shortened in the summer, lest the flowers should be cut off. The shrubs will grow to be ten or twelve feet high, and must not be checked in their growth, if intended to flower well. They are all highly ornamental plants, mostly for the shrubby borders and clumps, being planted according to their habits of growth.

ROSA, SALVATOR, in *Biography*, so well known among the cognoscenti as the author of spirited and extravagant pictures of banditti, &c., was born at Naples in 1614, and received his first knowledge of design from his kinsman, F. Franczani; but by the death of his father, being reduced to extreme poverty, he was constrained to provide himself a maintenance by sketching designs upon paper, and selling them at any price he could obtain.

In that wretched situation he laboured for some time, till one of his designs, an historical subject of Hagar and Ishmael, accidentally happened to fall into the hands of Lanfranc. Pleased with the ability it displayed, he eagerly enquired for the artist; and as soon as he became acquainted with him, took him under his protection, and provided for him generously. This unexpected and happy change in his circumstances, enabled Salvator to pursue his studies with more effect; and he soon acquired considerable eminence, and his works were eagerly sought after.

The style which he formed is peculiarly his own, and his best productions are beautiful imitations of nature; but in general his works are artificial combinations, and wrought with extravagance; the spirit and fire with which they are executed, too frequently giving them a consequence and a name they do not deserve. This, indeed, may perhaps be said, that half the pictures which go under his name, are spurious or heavy imitations, and he pays the tax which all mannerists, like him, must submit to.

He certainly possessed a comprehensive genius; and was an excellent satirical poet, as well as an ingenious painter. In landscape painting he was entirely original, delighting in scenes of desolation and terror; there he peopled with banditti repoting, or lurking for their prey, or dividing their spoils; lonely shepherds, or forlorn travellers. Sometimes he attempted to create an interest by filling the scene he drew with some sacred or historic subject, but in this he seldom succeeded; his figures being ill proportioned, falsely attired, and void of expression. In colour he sometimes attained excellence. The dull, low, or lurid tone, which so justly becomes the character of loneliness, of forests almost impenetrable, or dreadful to see, and conveying ideas of danger in their aspect, he frequently presented most perfectly; and wrought the various parts with the greatest freedom of touch, and the utmost readiness of invention. His pictures are not unfrequent in our collections in this country; and genuine ones of the first quality are sold at extravagant prices. He died at the age of 59, in the year 1673.

Among musical MSS. purchased at Rome in 1770, was the music-book of Salvator Rosa, the painter, in which are contained, not only airs and cantatas set by Carissimi, Cesti, Luigi, Cavalli, Legrenzi, Capellini, Pasqualini, and Bandini, of which the words of several are by Salvator Rosa; but eight entire cantatas written, set, and transcribed by this celebrated painter himself. The book was purchased of his great grand-daughter, who inhabited the house in which her ancestor lived and died. The hand-writing was

ascertained by collation with his letters and fatires, of which the originals are still preserved by his descendants. The historians of Italian poetry, though they often mention Salvator as a satirist, seem never to have heard of his lyrical productions; and as this book is not only curious for the music it contains, but the poetry, we shall be somewhat minute in our account of its contents.

The first composition in this MS. was luckily a scene in Cesti's opera of Orontea, which it would have been difficult to have found elsewhere; for of the many hundred operas that were composed for the different theatres of Italy, during the last century, except two or three that have been printed, an entire copy, in score, it would be difficult to find, if not impossible.

II. Is a cantata by Capellini, a composer of no great eminence; yet there is in it a very pleasing air in triple time of $\frac{3}{8}$, in which the crotchets are expressed by minims hooked or tied like quavers.

III. Is an elegant simple air, by Legrenzi, sung to two different stanzas. See LEGRENZI.

IV. Is a beautiful Siciliana by Cavalli, the composer of *Erifmena*. See CAVALLI.

V. Is a cantata written by Salvator Rosa, and set by Cesti. Recitative had not, as yet, banished formal closes, or regular modulation, which encroached too much upon air, and destroyed its narrative and declamatory plainness and simplicity.

Salvator was either the most miserable or the most discontented of men. Most of his cantatas are filled with the bitterest complaints, either against his mistresses, or mankind in general. In this he says, that he has had more misfortunes than there are stars in the firmament, and that he has lived six lustres (thirty years) without the enjoyment of one happy day.

VI. Is a cantata set by Luigi, almost wholly in recitative, which, but for the formality of the closes, would be admirable. See LUIGI.

VII. Another cantata by the same composer, of which the words are very beautiful.

VIII. A cantata set by Carissimi, in which the melody is impassioned, and the recitative admirable. See CARISSIMI.

IX. Is a pleasing and natural air by Marc Antonio Pasqualini, which is repeated to different stanzas. The composer of this air was admitted into the Papal chapel in 1630; and from the year 1643 to 1670, he was a favourite stage-singer, with a soprano voice. Many of his compositions are preferred in the collections of the time, in which more grace and facility appear than force and learning.

X. A cantata, of which the words are by Salvator Rosa, and the music by Cesti. There are great strength and imagination in this poetry.

In the church of Santa Maria degli Angeli de' PP. Certosini, at Rome, where Salvator Rosa was buried, there is an inscription on his tomb, at which Crecimbeni, a Florentine, is angry; as it gives him *il primato sopra tutti i Rimatori Toscani*. This, like almost all monumental praise, is certainly hyperbolic; but Salvator's poetry seems to have great merit for its boldness and originality; it is indeed somewhat rough, even in his lyrics; and his fatires are often coarse; but he appears to us always more pithy than his contemporaries, whom Marini's affectation had perhaps enervated and corrupted.

Salvator's cantata, of which we are now speaking, is the incantation of a female, distracted with love, disappointment, and revenge. This lyric poem seems to have furnished ideas to the author of Purcell's *Mad Bets*.—"By the

the croaking of the toad," &c. And in Salvator all the charms and spells of the witches in Macbeth are invoked.

XI. Is a gloomy, grumbling history of this painter and poet-musician's life, in which the comic exaggeration is not unpleasant; but it is rather a satire on the times in which he lived, than a lyric composition. However, it is set by Bandini; but being chiefly narrative, the music is almost wholly recitative; scarcely any measured melody being introduced, except to the first line, which serves as a refrain, or burden.

XII. Is an excellent cantata on the torments of *jealousy*, set by Luigi, in which there is more air and less recitative than usual at this period.

XIII. Is a single air by Alessandro Scarlatti, which must have been produced early in that great composer's life; as Salvator, in whose hand-writing it is entered in his book, died in 1675 (Orlandi *Abcdario Pittorico*); some writers say in 1673. See SCARLATTI.

XIV. and XV. Are two single airs by Legrenzi, of which the melody is pleasing; they were perhaps sung in operas. The music of all the rest of the cantatas and songs in this book, amounting to eight, is of Salvator's own composition, and is not only admirable for a dilettante, but in point of melody superior to that of most of the masters of his time.

The two first are cantatas, but so ill written as to be difficult to read. The third begins with a pleasing air; and the fourth with such a spirited movement as the seventeenth century seldom produced. Two other airs in the same cantata are well accented, and pleasing. In the recitative of the fifth cantata, some of the first true closes occur that we have met with in narrative melody. There are several airs in this and the rest of Salvator's cantatas on pleasing subjects, and treated in a manner above mediocrity. The last of his airs is chiefly remarkable for its moving base: and if we only suppose this cantata to have been composed just before the author's death, it will be of a higher date than the publication, or perhaps the existence of any of Corelli's works, who is supposed to have been the inventor of this kind of pendulum base; which, however, frequently occurs in the cantatas of Cesti.

Whoever is curious to see specimens of Salvator Rosa's musical compositions, may find in the fourth volume of Burney's *Gen. Hist. Mus.* fragments, not only of his own productions, but of his contemporary composers of eminence, whose works he thought worth entering in his music-book. Signorelli, tom. v. p. 338.

ROSA DA TIVOLI. See ROOS.

ROSA, in *Geography*, a small island near the E. coast of Sardinia. N. lat. $39^{\circ} 5'$. E. long. $9^{\circ} 3'$.—Also, a town of Germany, in the county of Henneberg; five miles S. of Saltzungen.—Also, a town of Spain, in the province of Seville; eight miles S. of San Lucar.

ROSA. See ST. ROSA.

ROSA, *Cape*, a cape on the coast of Algiers. N. lat. $37^{\circ} 2'$. E. long. $8^{\circ} 5'$.

ROSA, *Mount*, an eminence of the Alps, reckoned the second mountain of that famous ridge, lying about midway between Great St. Bernard and the lake of Locarno. M. Sauffure visited this mountain, which has been reckoned only 60 feet inferior in height to Mont Blanc, this being estimated about 14,700 feet above the level of the sea. But in Sir George Shuckburgh's table of heights taken by the barometer, &c. (Phil. Trans. vol. lxvii. p. 592.) Mont Blanc is elevated 14,432 feet above the lake of Geneva, and 15,662 feet above the Mediterranean;

and mount Rofa, as measured geometrically by Father Beccaria, is 15,084 feet above the same sea.

ROSA *Crucis*, in *Church History*. See ROSYCRUCIANS.

ROSA *Fatuina*, in *Botany*, a name given by some authors to the piony.

ROSA *Junonis*, a name given by some authors to the lily.

ROSACEÆ, the 92d natural order in Jussieu's system, the 10th of his 14th class. See FICOIDEÆ, for the distinctions of that class. The characters of this large and important order, named from the Rose, and rose-like flowers, which compose it, are the following.

Calyx either superior, and tubular; or inferior, pitcher or wheel-shaped; its limb mostly divided, and generally permanent. *Petals* definite, usually five, inserted into the upper part of the calyx and alternate with its divisions; sometimes wanting. *Stamens* indefinite, rarely definite, inserted into the same part below the petals; anthers often roundish. *Germen* in some cases simple, inferior, the styles and stigmas mostly numerous; in others superior, simple, with one style, or manifold with many styles; the styles in every instance lateral, or proceeding from the side of each germen. Structure of the *fruit* various; in some an inferior apple, of many cells, or a sort of cup or urn, apparently inferior, bearing many seeds, over which it closes; in others the seeds, or seed-vessels, each of one cell, and mostly single-seeded, indefinite or definite, are superior, standing on a common receptacle; in others, again, there is either a solitary superior capsule of one cell; or a superior nut, with one or two seeds, which is either naked, or invested with a drupaceous coat. The scar of each seed is lateral, just below the summit, connected by a thread, or umbilical cord, with the lower part of the seed-vessel. *Coraculum* straight, without an albumen. *Stem* herbaceous, shrubby, or arboreous. *Leaves* either simple or compound, alternate, accompanied by stipules.

SECTION 1. POMACEÆ. *Germen* simple, inferior, with many styles. *Apple* umbilicated, or bordered, with the limb of the calyx, of many cells. Trees or shrubs.—This section contains the Linnæan genera of *Pyrus*, (from which Jussieu distinguishes *Malus* and *Cydonia*), *Mespilus*, *Cratægus*, and *Sorbus*.

SECT. 2. ROSÆ properly so called. *Germens* several, indefinite, invested with the urn-like calyx contracted at the top, so that they seem inferior; each accompanied by one style. Seeds as many. Shrubs.—*Rosa* here stands alone.

SECT. 3. SANGUISORBÆ. *Germens* several, definite, rarely solitary, invested with cup-like calyx contracted at the top, so that they seem inferior; each with one style. Seeds as many. Mostly herbaceous, many of them without petals, many with a definite number of stamens, some with stamens and pistils in separate flowers.

Poterium, *Sanguisorba*, *Ancistrum*, *Acana*, *Agrimonia*, *Neurada*, *Cliffortia*, *Aphanes*, *Alchimilla*, and *Sibbaldia*.

SECT. 4. POTENTILLÆ. *Germens* several, indefinite, truly superior, standing on a common receptacle, each with one style. Seeds as many, naked, rarely pulpy.—Herbs, rarely shrubs.

Tormentilla, *Potentilla*, *Fragaria*, *Comarum*, *Geum*, *Dryas*, *Rubus*; to which is to be added our *Duchesnea*, (see FRAGARIA, at the conclusion) now described in Tr. of Linn. Soc. v. 10. 372.

SECT. 5. SPIRÆÆ. *Germens* several, definite, superior, each with one style. Capsules as many, with one or more seeds.—Shrubs, rarely herbs.

Spiræa, *Suriana*, and *Tetracera*.

SECT. 6. PROCKIÆ. *Germen* single, superior, with one style.

style. Fruit of one cell, with one or more seeds.—Trees or shrubs, sometimes destitute of petals.

Tigarea of Aublet; *Delima*, *Prockia*, and *Hirtella* of Linnæus.

SECT. 7. AMYGDALÆÆ. *Germen single, superior, with one style. Nut either naked, or more usually invested with a pulpy coat, and containing one or two seeds.*

Hedycera of Schreber, which is Aublet's *Licania*; *Grangeria* of Commerçon; *Chrysoalanus* of Linnæus; *Cerasus*, *Prunus* and *Armeniaca* of Tournefort, all three included in the Linnæan *Prunus*; *Amygdalus* of Tournefort and Linnæus, including *Perfica* of the former; *Moquilea*, *Couepia*, and *Acia* of Aublet, (the latter Schreber's *Acia*); and *Parinari* of Aublet, which is Schreber's *Petrocarya*.

SECT. 8. *Genera akin to the Rosaceæ.*

Plinia of Plumier and Linnæus, the uncertainty of whose history we have fully explained; see *PLINIA*.

Calycanthus, allied by its fruit to *Rosa*, but the leaves are opposite and simple, and the flower in a manner apetalous.

Ludia of Commerçon; *Blackwellia* of the same author; *Homalium* of Jacquin and Linnæus; and *Napimoga* of Aublet. The three last appear to constitute one genus; see *HOMALIUM*.

ROSACEOUS COROLLA, is one which consists of several petals ranged in a circle; so that, according to Tournefort's acceptation of the word, it includes, not only the natural order of ROSACEÆ, (see that article,) and other flowers agreeing therewith in having mostly five petals, as *Ranunculus*; but even such as have only two, like *Circea*. The author is obliged to exclude the Cruciform and Umbelliferous plants from this order by a particular and arbitrary exception; for according to his primary idea, it would admit every polypetalous regular flower, as well as some that are irregular, as *Cassia*, &c. See *COROLLA*.

ROSACLORUM, or, according to some authors, *Reschiero*, a fine red used to enamel on gold with. It is prepared in this manner: take ten pounds of crystal-glass, put it into a pot, and when it is well melted, add to it, at twice, a pound of the best red-lead; stir the mass well together, and afterwards cast it into water. Repeat this process three times, then when the matter is again in fusion, mix with it five ounces of calcined brass, and the same quantity of the deepest cinnabar; stir the whole well together, and let it settle three hours; then add of glass of tin three ounces, mix the whole, and it will be of a fine rose-colour. Merret's Notes on Neri, p. 350.

ROSADE, a kind of liquor, prepared of pounded almonds and milk, mixed with clarified sugar.

ROSALBA, *CARRIERA*, in *Biography*, was of Chiozza, and carried crayon painting to a high degree of perfection. Orlandi celebrates her miniatures. Her crayon painting arrives, not seldom, at the strength of painting in oil. Her portraits spread all over Europe, are as elegant and graceful in conception and attitude, as fresh, neat, and alluring in colour. Her Madonnas, and other sacred subjects, rise from grace to dignity, and even majesty. Equal and incessant application deprived her of sight during the last ten years of her life. She died in 1757, at the age of 82.

Rosalba is celebrated by Walther for her musical talents and exquisite taste in singing.

ROSALE, in *Geography*, a town of Persia, in the province of Fars, or Farsitan; 15 miles W. of Kazeron.

ROSALGATE, CAPE. See *RASALGATA*.

ROSALIA, a name used by authors for the measles, or

a disease very like the measles, consisting of a number of apertures and protuberances of the skin, which soon die away.

ROSALIA, in *Music*. See *REPETITIONS*.

ROSALIND, a mask, written by Lockman, set by Smith for Hickford's rooms, and performed there in still life, oratorio wife, in 1740. This little drama would not be mentioned here, as the poetry is upon a level with Mr. Lockman's other productions; and of the music we know nothing, as it was never published. But as, "to raise the pamphlet price a shilling," the poetry is preceded by "inquiries into the origin of operas."

ROSAMARINA, in *Geography*, a town of Sicily, in the valley of Demona, at the mouth of a river of the same name, which runs into the sea, 10 miles N.E. of Miltretta.

ROSAMOND, in *Biography*, daughter of lord Clifford, was a young lady of great beauty, fine accomplishments, and endowed with the most engaging wit and sweetness of temper. She had been educated, according to the custom of the times, in the nunnery of Godstow, and the popular history of her is as follows. Henry II. of England saw her, was smitten with her beauty, and triumphed over her honour. To avoid the jealousy of his queen, Eleanor, he kept her in a labyrinth at Woodstock, and by his connection with her had two children, who were afterwards William Longsword, earl of Salisbury, and Geoffrey, bishop of Lincoln. On Henry's absence in France, the queen found means to discover her, and, jealous of her great beauty, caused her to be poisoned. This story is not well supported by historical documents. Several writers mention no more of her, than that the queen caused her to be so harassed, that she did not long survive after she was discovered. Other writers assert, that she died a natural death, and the story of her being poisoned is supposed to have arisen from the figure of a cup being placed on her tomb. She was buried in the church of Godstow, opposite to the high altar, where her body remained till it was ordered to be removed with every mark of disgrace by Hugh, bishop of Lincoln, in 1191. By many, however, she has been regarded as a saint, but her history is in every respect very uncertain. See Grosé's *Antiq. of Eng. and Wales*.

ROSAMOND, an English opera, written by Addison on the Italian model. After the great success of *Artinoe* and *Camilla* in 1705 and 1706, in which the dialogue was wholly spoken in recitative, and the performers all English singers; in 1707, notwithstanding the deficiencies of those dramas in poetry, music, and performance (for as yet no foreign composer or captivating singer was arrived) this kind of exhibition became so formidable to our own actors, that a subscription was opened the beginning of this year, "for the encouragement of the comedians acting in the Haymarket, and to enable them to keep the diversion of plays under a separate interest from operas." *Daily Courant*, January 14th, Cibber gives a circumstantial account of this humiliating transaction, and speaks of its success with considerable triumph. See *CLAYTON*.

The verses of Rosamond are highly polished, and more lyrical perhaps than in any poem of the same kind in our language. And yet this drama is not wholly free from opera absurdities, on which Addison was afterwards so severely pleasant. For instance, the king's approach to the secret bower of bliss, where his fair Rosamond was treasured up from the resentment of his jealous queen, is always announced and published by a loud concert of military instruments: Act i. sc. 1.

"Hark,

“ Hark, hark! what found invades my ear?
The conqueror’s approach I hear.
He comes, victorious Henry comes!
Hautbois, trumpets, fifes, and drums,
In dreadful concert join’d,
Send from afar the sound of war,
And fill with horror ev’ry wind.”

It was the fashion in almost all the serious operas that were written in Italy, before the time of Apostolo Zeno and Metastasio, to mix comic and buffoon characters with the tragic, even in *dramme sacri*, notwithstanding the severity of some Italian critics upon our Shakspeare for the same practice.

And Mr. Addison has fully complied with this custom, in the characters of Sir Trusty and Grideline, which are of the lowest species of comic.

If it can be proved that gunpowder was invented, and in military use in the time of Henry II. Mr. Addison was guilty of an anachronism in making him ask,

“ Why did I not in battle fall
Crush’d by the thunder of the Gaul?”

The loss of Rosamond in the second act of this drama is not compensated by a single interesting event in the third, which drags and languishes for want of her so much, that neither the flat and forced humour of Sir Trusty and Grideline, nor the elegant compliments made to the duke of Marlborough and Blenheim, ever kept the audience awake in the performance.

In 1733, Rosamond was set by Mr. (afterwards Dr.) Arne, his first attempt at dramatic music, in the performance of which his sister, Miss Arne, afterwards the justly celebrated actress Mrs. Cibber, performed the part of Rosamond. The airs in this *coup d’essai* of Arne, were extremely pleasing, and far superior to those of any English composer of that period. Many of them were afterwards sung at Vauxhall by Mrs. Arne and Low with great applause. “ Was ever Nymph like Rosamond,” was long in universal favour all over the kingdom.

ROSAN, in *Geography*, a town of the duchy of Warsaw, on the Narew; 110 miles E. of Thorn.

ROSANA, a river of Germany, which runs into the Inn, near Landeck, in the county of Tyrol.

ROSANI, CAPE, a cape on the coast of Romania, in the Grecian Archipelago. N. lat. 40° 35'. E. long. 24° 14'.

ROSANNA, a town of Lithuania, in the palatinate of Novogrodek; 36 miles W. of Novogrodek.

ROSARBA, in *Botany*, the name of an imaginary plant, which has given great trouble to the commentators on the works of the ancients.

The Arabian writers, Avicenna, Serapion, and others, have mentioned two kinds of carob or ceration; the one esculent, and endowed with the virtue of a gentle purgative, the other an astringent.

This last they have distinguished from the other by the name of the nabathæan pod or aljambut. They say in their descriptions, that the aljambut is like the rosarba; so run the old translations, but the true meaning of the original is *rosa vineæ*. This was a name given to the common wild acacia-tree, and the tree which produced the nabathæan pod, might be very well likened to this; it being, in reality, only a species of the acacia, and the fucus acaciæ, or inspissated acacia juice of the shops, being, according to Isidore, made oftentimes from the unripe fruit of this very species.

ROSARIA, among the Romans, a kind of perfumes, so called either from their being chiefly made of roses, or because they had a most exquisite odour.

ROSARIO, in *Geography*, a small island in the Spanish main, near the coast of Carthage. N. lat. 10° 5'. W. long. 75° 56'.—Also, a town of New Navarre; 30 miles S.W. of Casa Grande.—Also, a town of South America, in the province of Tucuman; 78 miles N. of St. Miguel de Tucuman.—Also, a town of Brazil, in the government of Minas Geraes; 220 miles N. of Villa Rica.—Also, a town of North America, in the county of California; 30 miles S.W. of Loreto.—Also, a town of the island of Cuba; 45 miles S. of Havannah.

ROSARIO, *El*, a town of Mexico, in the province of Chiapa; 140 miles S.E. of Chiapa dos Españols.

ROSARIO, or *Nuestra Señora del Rosario*, a canal of a strait in the gulf of Georgia, which separates the island of Florida from America; about 30 miles in length. At the S.E. extremity the canal is six miles broad; but towards the N.W. its breadth is gradually diminished to two miles, in its narrowest part.

ROSARUM ACETUM. See ACETUM.

ROSARUOLO, in *Geography*, a town of Itria; 8 miles E. of Capo d’Itria.

ROSARY, in the *Romish Church*, a chaplet consisting of five or fifteen decads of beads, to direct the recitation of so many Ave Maria’s, in honour of the Virgin.

ROSARY also denotes a particular mass or form of devotion addressed to the Virgin, to which the chaplet of that name is accommodated. It consists of fifteen repetitions of the Lord’s prayer, and an hundred and fifty salutations of the blessed Virgin; whilst the *crown*, as it is called, according to the different opinions of the learned concerning the age of the Virgin, consists of six or seven repetitions of the Lord’s prayer, and six or seven times ten salutations or Ave Maria’s.

Some attribute the institution of the rosary to St. Dominic; but F. d’Achery shews it was in use the year 1100; so that St. Dominic could only make it more celebrated. Others attribute it to Paulus Libycus, and others to St. Benedict; others to the Chartreux; others to Venerable Bede; and, finally, others to Peter the Hermit. Those who ascribe it to St. Dominic, differ as to the particular time of its institution; some referring it to the year 1208, when he preached against the Albigenes; others will have him to have set it on foot in the course of his missions in Spain, before he passed into France.

ROSARY, *Order of the*, or of *our Lady of the Rosary*, is an order of knights, supposed by Schoonebeck, and the Jesuit Bonanni, to have been instituted by St. Dominic, but by mistake; for that saint never instituted any order under this name, and these authors apparently make a military order of an army of crosses, who, under the command of the count de Montfort, fought against the Albigenes.

The abbot Justiniani, and M. Hermant, will have this order to have been established by an archbishop of Toledo, named Frederic, after St. Dominic’s death; and to have borne for a badge a black and white cross, in the middle of which was represented our Lady, holding her little son in one hand, and in the other a rosary. F. Mendo adds, that they were obliged to rehearse the rosary on certain days. After all, F. Helyot doubts whether or no such an order in reality ever existed. Edmondson refers the institution of this order to the year 1212; and he says, the badge of the order was a cross patonce per cross countercharged argent and sable, surmounted on the centre with a medal or, enamelled

melled with the image of the Virgin, supporting the infant in one hand, and holding a rosary in the other, all proper. The order of the "Celestial Collar of the Holy Rosary" is a religious order for ladies, instituted at the request of father Francis Arnoul, a Dominican, by queen Anne of Austria, widow of the French king Lewis XIII., and mother of Lewis XIV., for fifty young ladies of the first families in France. The collar of the order was composed of a blue ribbon, enriched with white, red, and maiden's blush roses, interlaced with the capital letters A. V. in cypher affixed to it; and pendent at the breast by a silk cordon, a cross of eight points pomettée, and in each angle a fleur-de-lis: on the centre the image of the Virgin Mary, and on the reverse the image of St. Dominic, enamelled.

ROSARY is a word frequently met with in the ancient histories of Ireland, and used to express a peculiar sort of base money coined abroad, in the form of the penny, current in that kingdom; but of so much baser an alloy, that it was not worth quite half the real value of the penny. This and many other such coins were decried, and it was made death to import any of them, by Edward I., in 1300.

ROSARY, *Persian*, a beautiful compendium of oriental ethics, written by a Persian poet, whose name was Eddin Sadi; who, about the middle of the 13th century, when the Turks invaded Persia, withdrew from his own country, and settled at Bagdad, for the purpose of prosecuting his studies. After experiencing much vicissitude of fortune, he returned home, and compiled the book just mentioned, which he completed in the year 1257. This book, we are informed, has been universally read in the East; and has been translated into Latin, and into several modern languages. As our readers in general may not have access to the original work, which is divided into eight chapters, nor to extracts from it, we shall here subjoin, both for their information and amusement, the following citations.

1. Paradise will be the reward of those kings who restrain their resentment, and know how to forgive. A king, who institutes unjust laws, undermines the foundation of his kingdom. Let him, who neglects to raise the fallen, fear, lest when he himself falls, no one will stretch out his hand to lift him up. Administer justice to your people, for a day of judgment is at hand. The dishonest steward's hand will shake, when he comes to render an account of his trust. Be just, and fear not. Oppress not thy subjects, lest the sighing of the oppressed should ascend to heaven. If you wish to be great, be liberal; for, unless you sow the seed, there can be no increase. Assist and relieve the wretched, for misfortunes may happen to yourself. Wound no man unnecessarily; there are thorns enough in the path of human life. If a king take an apple from the garden of a subject, his servants will soon cut down the tree. The flock is not made for the shepherd, but the shepherd for the flock.

2. Excel in good works, and wear what you please: innocence and piety do not consist in wearing an old or coarse garment. Learn virtue from the vicious; and what offends you in their conduct, avoid in your own. If you have received an injury, bear it patiently: by pardoning the offences of others, you will wash away your own. Him, who has been every day conferring upon you new favours, pardon, if, in the space of a long life, he should have once done you an injury. Respect the memory of the good, that your good name may live for ever.

3. In your adversity, do not visit your friend with a sad countenance; for you will embitter his cup: relate even your misfortunes with a smile; for wretchedness will never reach the heart of a cheerful man. He who lives upon the

fruits of his own labour, escapes the contempt of haughty benefactors. Always encounter petulance with gentleness, and perverseness with kindness: a gentle hand will lead the elephant itself by a hair. When once you have offended a man, do not presume that a hundred benefits will secure you from revenge: an arrow may be drawn out of a wound, but an injury is never forgotten. Worse than the venom of a serpent is the tongue of an enemy, who pretends to be your friend.

4. It is better to be silent upon points we understand, than to be put to shame by being questioned upon things of which we are ignorant. A wife man will not contend with a fool. It is a certain mark of folly, as well as rudeness, to speak whilst another is speaking. If you are wise, you will speak less than you know.

5. Although you can repeat every word of the Koran, if you suffer yourself to be enslaved by love, you have not yet learned your alphabet. The immature grape is sour; wait a few days, and it will become sweet. If you resist temptation, do not assure yourself that you shall escape slander. The reputation, which has been fifty years in building, may be thrown down by one blast of calumny. Listen not to the tale of friendship, from the man who has been capable of forgetting his friend in adversity.

6. Perseverance accomplishes more than precipitation; the patient mule, which travels slowly night and day, will in the end go further than an Arabian courser. If you are old, leave sports and jests to the young; the stream, which has passed away, will not return into its channel.

7. Instruction is only profitable to those who are capable of receiving it: bring an ass to Mecca, and it will still return an ass. If you would be your father's heir, learn his wisdom: his wealth you may expend in ten days. He who is tinctured with good principles while he is young, when he is grown old will not be destitute of virtue. If a man be destitute of knowledge, prudence, and virtue, his door-keeper may say, Nobody is at home. Give advice where you ought; if it be not regarded, the fault is not yours.

8. Two kinds of men labour in vain: they who get riches, and do not enjoy them; and they who learn wisdom, and do not apply it to the conduct of life. A wise man, who is not at the same time virtuous, is a blind man carrying a lamp: he gives light to others, whilst he himself remains in darkness. If you wish to sleep soundly, provide for to-morrow. Trust no man, even your best friend, with a secret; you will never find a more faithful guardian of the trust than yourself. Let your misfortunes teach you compassion: he knows the condition of the wretched, who has himself been wretched. Excessive vehemence creates enmity; excessive gentleness, contempt: be neither so severe, as to be hated; nor so mild, as to be insulted. He who throws away advice upon a conceited man, himself wants an adviser. In a single hour you may discover, whether a man has good sense; but it will require many years to discover whether he has good temper. Three things are unattainable; riches without trouble, science without controversy, and government without punishment. Clemency to the wicked is an injury to the good. If learning were banished from the earth, there would, notwithstanding, be no one who would think himself ignorant. Brucker's Hist. of Philos. by Enfield, vol. ii.

ROSAS, in *Geography*, a sea-port town of Spain, in Catalonia, on the north side of a gulf of the Mediterranean, to which it gives name, with a good harbour, defended by a fort. It was anciently called "Rhoda," and "Rhodope;" 22 miles N.E. of Gerona. N. lat. 42° 17'. E. long. 3° 0'.

ROSATA ALOE. See **ALOE.**

ROSATE, in *Geography*, a town of Italy, in the department of the Olona; 9 miles S.W. of Milan.

ROSATUM ACETUM. See **ACETUM.**

ROSATUM VINUM. See **VINUM.**

ROSAZZO, in *Geography*, a town of Italy, in Friuli; 6 miles S. of Friuli.

ROSBACH, a town of Germany, in the county of Sayn; 8 miles E. of Hachenburg. See **ROSSBACH.**

ROSBEGH POINT, a cape on the west coast of Ireland. N. lat. $52^{\circ} 6'$. W. long. $9^{\circ} 52'$.

ROSBOTH, a word used by some authors to express a soft excrecence from any part.

ROSCHINTZE, in *Geography*, a town of Prussia, in Natangen; 12 miles S. of Lick.

ROSCHITZ, a town of Austria; 2 miles S.W. of Schrottentaal.—Also, a town of Moravia, in the circle of Brunn; 8 miles W. of Brunn.

ROSCIUS, QUINTUS, in *Biography*, a Roman actor of great celebrity, was a native of Gaul. He was contemporary at Rome with the celebrated actor Esopus. So great were his talents for the stage, and such was the degree of perfection to which he carried his art, that, according to Cicero, a complete master in any other art was popularly called the Roscius of it. Roscius was not less esteemed for his morals and good conduct, than admired for his professional talents. The greatest men in the state were his intimate friends, and the loss of him was universally lamented. "Which of us," says Cicero, alluding to Roscius in his oration for the poet Archias, "was so rude and unfeeling as not to be affected by the recent death of Roscius, who, though he died at an advanced age, appeared, on account of his excellence in his art, worthy of immortal life." His death took place in the year 61 B.C. He composed a parallel between theatrical and oratorical action, which is lost.

There are several passages in Cicero concerning Roscius, which, if the ancient actors, Romans as well as Greeks, did not declaim in musical notes, would be wholly unintelligible. He tells us (de Orat.), that Roscius had always said, when age should diminish his force, he would not abandon the stage, but would proportion his performance to his powers, and make music conform to the weakness of his voice; which really happened: for the same author informs us (de Leg.), that in his old age he sung in a lower pitch of voice, and made the tibicines play slower.

As there were combats, or contests, established by the ancients for the voice, as well as for other parts of the *Gymnastice*, those who taught the management of the voice were called *Φωνασκοί*, *phonasci*; and under their instructions were put all those who were destined to be orators, singers, and comedians. Roscius had an academy for declamation, at which he taught several persons, preparatory to their speaking in public, or going on the stage. He had a law-suit with one of them, in which Cicero pleaded his cause.

These are proofs sufficient of the dramatic declamation of the ancients being uttered in musical tones, agreeing with those of the musical instruments by which they were accompanied. See **DECLAMATION** and **RECITATIVE.**

ROSCOEIA, in *Botany*, being a new and very distinct genus of the natural order of *Scitamineæ*, was dedicated, by the writer of the present article, to his distinguished friend William Roscoe, esq. F.L.S., whose papers in the Linnæan Society's Transactions, and especially his New Arrangement of the order in question, printed in their eighth volume, richly entitle him to this botanical honour. Of his

particular observations and discoveries respecting this order, by which he has reduced to clear scientific principles, what had hitherto been an indigested chaos, we shall speak under the article *SCITAMINEÆ*, in its proper place.—Sm. Exot. Bot. v. 2. 97.—Clafs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Canna*, Juss.

Gen. Ch. *Cal.* Perianth superior, of one leaf, tubular, cylindrical, its limb sheathing, erect, undivided, membranous at the edge. *Cor.* of one petal, irregular; tube scarcely longer than the calyx, erect, straight, triangular upwards: outer limb ringent, two-lipped; its upper lip broadest, erect, obovate, acute, concave; lower about as long, in two deep, linear-lanceolate, acute, reflexed lobes; inner limb ringent, two-lipped; the upper lip erect, shorter than the outer limb, of two cohering, half-ovate lobes, tapering at the base, and embracing the organs of fructification; lower much longer and broader, spreading, cloven. *Stam.* Filament one, inserted into the top of the tube, short, linear, channelled, erect; anther much longer than the filament, linear, channelled, greatly incurved, bearing pollen in the upper part only, its base extended in the form of two lanceolate, horizontal, ascending, acute, membranous lobes. *Pist.* Germen inferior, oval, very small; style thread-shaped, lodged in the groove of the filament, and of the anther, to whose curvature it conforms; stigma obtuse, concave, downy, just projecting beyond the anther. *Peric.* Capsule? we presume it to be analogous to that of other *Scitamineæ*.

Eff. Ch. Anther two-lobed, incurved, terminal, embracing the style, with a cloven appendage at its base. Outer limb of the corolla irregular; upper lip vaulted; lower deeply divided: inner limb in three parts, two-lipped.

1. *R. purpurea*. Purple Roscoea. Sm. Exot. Bot. v. 2. 97. t. 108. (Hatucon Swa of the Nawars of Nepal.)—This plant was found at Narainhetty, in the mountains of Upper Nepal, by Dr. Francis Buchanan, flowering in April 1802. It is the only species, hitherto discovered, of this very well-defined genus, which should be arranged near *HEDYCHUM* and *KÆMPFERIA*, (see those articles,) to both of which genera it has some points of affinity; but *Roscoea* is distinguished from every other known plant of the *Scitamineæ*, by the irregularity of its two-lipped outer limb, and the peculiar appendages to the base of the anther.

The root is perennial, of several, clustered, spreading, oblong, tapering knobs, producing branched fibres. No aromatic or pungent flavour is perceptible in our specimens. *Stem* solitary, erect, a foot or more in height, simple, leafy, compressed. *Leaves* spreading in two ranks, alternate, oblong, pointed, folded, wavy, entire, smooth, with many oblique parallel veins; pale at the under side; somewhat rounded and heart-shaped at the base, running down into broad, sheathing, compressed, furrowed, purplish *footstalks*, which embrace and conceal the stem. *Stipula* crowning the inside of the footstalk, very short, entire. *Flowers* several, opening in succession, terminal, clustered, sessile, erect, large, and handsome, of a violet-purple, with whitish organs of impregnation; the tube of the calyx of each concealed by the sheaths of the upper leaves.

ROSCOFF, or **ROSCOU**, in *Geography*, a sea-port town of France, in the department of Finisterre; 4 miles N. of St. Pol de Leon. As a sea-port it is much frequented by those who carry on a contraband trade with England, especially in wine and brandy. The inhabitants used formerly to import linseed, and export linen manufactured in the country annually to the amount of 500,000 livres. Since the

the revolution this trade has been interrupted, but with the return of peace may be easily revived. The harbour, however, without timely precaution, is in danger of being choked up with sand. In the neighbourhood of the town, and throughout the department of Finisterre, the fields are manured with sea-weed. Wood is very scarce, and their fruit-trees occasionally serve for fuel. In the island of Bas they burn cow-dung and sea-weed. Roscoff contains 1000 inhabitants; nevertheless, the depopulation from its loss of trade, the arid sandy ground on which it is built, and the desolated ruins of former establishments, give the place a melancholy appearance of desolation. In this place there is not a single fountain, nor any institution for the instruction of youth, nor any regulation for preserving the health of the inhabitants. This is said to be the place where the chevalier St. George landed, after his unsuccessful attempt in 1745.

ROSCOLÆ, a name given by some medical writers to the measles.

ROSCOMMON, *Earl of*, in *Biography*. See **DILLON**.

ROSCOMMON, in *Geography*, a county of Ireland, in the province of Connaught, is bounded on the east by the river Shannon, which separates it from the King's county, West-Meath, Longford, and Leitrim; and on the west by Galway, Mayo, and Sligo. Towards the north and south it is contracted into narrow necks of land, between the east and west confines. According to Dr. Beaufort, its length from north to south is 47 miles (60 English), and its breadth about the middle of the county 29 (37 English) miles. The latter varies considerably, being in some parts less than 10 miles. The area measures 346,650 acres, or 541 square miles, equal to 556,847 acres, or 869 square miles, English measure. This county contains 56 parishes, 22 of which have churches. Of these the greater part are under the see of Elphin. When Dr. Beaufort wrote, the population was estimated at 86,000; what it is at present cannot be ascertained. Roscommon is a flat open country, in some places sprinkled with rocks, in many interrupted by extensive bogs, and but little diversified with hills. The only mountains within the county are in a narrow part between Lough Arrow and Lough Allen; and these are become valuable, on account of the coal and iron which they are found to contain. The lofty Curlew mountains, which join Lough Arrow, separate this county from Sligo. The Shannon beautifully delineates the eastern confines, branching in a course of 50 miles into several fine lakes, of which Lough Ree, Lough Baffin, and Lough Allen, are the largest. The Suck divides it from Galway for a great length of way, till it loses its name and waters in the Shannon. A number of small streams from the interior intersect the county, fertilizing and enlivening the fields. The largest of the lakes is Lough Key, in the north of the county, which is rendered delightful by wooded islands and surrounding groves. The soil is fertile; lime-stone and marble are abundant, and the climate not severe. The county has long been famed for its pastures; but as population increases, wants and cares are augmented, and pasturage gives way to tillage, as a more abundant source of supply. Hence we find, that although pasturage is calculated to cramp population, yet, by the introduction of manufactures, it may be so increased, that pastures must be broken up and tilled. This natural course of events has operated very powerfully in Roscommon. The manufacture of linen and woollen stuffs has been diffused; bounties have also been offered for farinaceous produce; and under these necessities and incitements, pasturage has considerably decreased. It has been contended, that converting such rich pastures to tillage

must prove a great loss to the country; but although the land cannot, for a considerable time, so fully repay the labours of the husbandman, as when in the zenith of their pastoral utility, yet in the end there cannot surely be a doubt of their more amply remunerating the country. In the pastoral economy of this district we find sheep the largest proportion of the farm-stock: bullocks and cows form a lesser share. Mr. Wakefield commends the quality of both. The farms are generally divided by stone-walls. Agriculture is in its infancy, but the abundance of lime-stone has contributed, in a great degree, to promote the extension of tillage. This is conducted on the same plan as in other parts of Connaught, and is thus described by Dr. M^rParlan. "The mode of culture is with a long narrow spade, commonly called a loy. This machine they prefer to ploughs, and assign many reasons for doing so. The hills are very steep, (speaking of Leitrim,) beset with stones; and notwithstanding the soil being generally gravelly, so tough and retentive of wet, as to render ploughing objectionable. They also complain of a scarcity of horses: but, above all, they assign, as a peculiar inducement, the abundance of crop produced by the loy culture compared to that of the plough. In some of the more level parts, ploughing is in practice; and in some others they unite both, first ploughing, then mincing and dressing with the loy. The soil being in general of the stiff argillaceous kind, wherever it is so, the potatoes are planted by dibbling with the *steven*. In a few places they plant, by spreading the cuts on the dung or green turf, and then digging up the furrows; and in still fewer, where the soil is light and friable, they plant potatoes by drilling with a one-horse plough, particularly in stubble and old potatoe ground." Mr. Wakefield calls this a faithful picture of the cultivation of this district. Roscommon is the shire-town, but Boyle is more thriving. None of the towns are large. The county is represented in parliament by two members only. Beaufort. Wakefield. Robertson.

ROSCOMMON, a post-town of Ireland, and the shire-town of the county of the same name, where the assizes are held. It is situated about three miles from the Shannon, where it expands into Lough Ree. It is a small place, agreeably situated, but has little trade. The ruins of a Dominican friary exhibit some remains of elegant architecture, especially a tomb of Felim O'Connor, king of Connaught, adorned with a number of emblematical devices. Roscommon is 69 miles W.N.W. from Dublin.

ROSCOTTY, a town of Thibet; 18 miles W. of Sirinagur.

ROSCREA, a post-town of the county of Tipperary, Ireland, on the border of the King's county. It is a neat and thriving town. The church is very ancient, and has a curious frontispiece at the west end. Near it stands one of the largest round towers in Ireland, all built with square stone, which is unusual in these edifices. Roscrea was once a bishopric, but was united with Killaloe in the twelfth century. The large old castle was built by the Ormond family. It is 59 miles S.W. from Dublin.

ROSE, in *Botany and Gardening*. See **ROSA**.

It is a tradition among the ancients, that the god of love made a present to Harpocrates, the god of silence, of a beautiful rose, the first that had been known, to engage him not to discover any of the private practices of his mother Venus. And hence it became a custom to have a rose placed in their rooms of mirth and entertainment, that under the assurance thereof they might be induced to lay aside all constraint, and speak what they pleased. Thus did the rose become a symbol of silence; so that to be *sub rosa*, under the

rose, denotes as much as to be out of danger of having any conversation divulged.

ROSE Bay. See NERIUM.

ROSE, *Campion*. See AGROSTEMMA.

ROSE, *Cbina*, the name by which some call the ketmia of botanists. See HIBISCUS.

ROSE, *Christmas*. See HELLEBORUS.

ROSE, *Corn*. See PAPAVER.

ROSE, *Mountain-bay*, or *Dwarf-bay*, a name by which the *chamærhodendros* of botanists is sometimes called. See KALMIA, and RHODODENDRUM.

ROSE, *Guelder*, a name sometimes given to the opulus, or water-elder. See VIBURNUM.

ROSE, *Virginian Guelder*. See SPIRÆA.

ROSE, *Martinico*. See HIBISCUS.

ROSE of *Jericho*, a name by which some call the hesperis. See ANASTATICA.

ROSE *Mallow*. See ALIZA.

ROSE, *South Sea*, a name sometimes given to the *Nerium* of botanists; which see.

ROSE, *Rock*. See CISTUS.

ROSE-*Root*. See RHODIOLA.

ROSE, in the *Materia Medica*. The flowers of the *Rosa canina*, dog-rose, or hep, are said by some botanists to be inodorous, and yet their fragrance is often very perceptible. The fruit called heps, or hips, has a pleasant acidulous taste, depending on the uncombined citric acid and sugar which it contains. This pulpy fruit is cooling, but possesses no specific medicinal virtue. It is used in the preparation of a conserve or confection. For this purpose the London pharmacopœia directs a pound of the pulp and 20 ounces of refined sugar, in powder, to be rubbed together until they be well incorporated; and in the Edinburgh Dispensatory, it is ordered, that the fresh fruit of the dog-rose, carefully freed from the seeds and inclosed spiculæ, be beaten into a pulp, and, while beating, that three times its weight of double refined sugar be gradually added. (See CONSERVE). Formerly, says Woodville, it was esteemed useful in many disorders, as dropics, calculous complaints, dysenteries, hæmorrhages, &c. A moss-like excrecence, called "Badeguar," "Rose-sponge," and by the French "Galle cheveluë," is frequently found upon the branches of this tree, and is the habitation of the insect called "cynips rosæ." This excrecence was formerly in great repute as a remedy for various diseases.

The *Rosa centifolia*, or hundred-leaved rose, of which there are many varieties, is improperly confounded in the Dublin pharmacopœia with the damask rose, *Rosa damascena*, which is altogether a different species. The petals of this species are directed for medicinal use. They are of a pale red colour, and of a very fragrant odour, which is to many people very agreeable, and therefore this as well as most of the other roses, are made up into nosegays: and these, in some circumstances, have produced alarming symptoms, such as sneezing, inflammation of the eyes, faintings, hysterical affections, abortion, &c.: and persons confined in a close room, with a large quantity of roses, have been in danger of immediate extinction of life. The petals impart their odorous matter to watery liquors, both by infusion and distillation. Six pounds of fresh roots impregnate, by distillation, a gallon or more of water strongly with their fine flavour. On distilling large quantities, there separates from the watery fluid a small portion of a fragrant butyraceous oil, which liquefies by heat, and appears yellow, but concretes in the cold into a white mass: 100 pounds of the flowers, according to the experiments of Tachenius and Hoffmai, afforded scarcely half an ounce of oil. The smell of this

oil exactly resembles that of the roses, and is therefore much used as a perfume.

The oil of roses possesses very little pungency, and has been highly recommended for its cordial and analeptic qualities. The flower also contains a bitterish substance, which is extracted by water along with the odorous principle, and remains entire in the decoction after the latter has been separated by distillation or evaporation. This fixed sapid matter of the petals manifests a purgative quality, and it is on this account that the flowers are received in the *materia medica*. The pharmacopœias direct a syrup to be prepared of this rose, which is ordered as an adjunct to oil and other purgatives in the diseases of infants; but they are chiefly employed for the distillation of rose-water. The London pharmacopœia directs seven ounces of the petals of the hundred-leaved rose dried to be macerated in four pints of boiling water for 12 hours, and to strain it; and then to evaporate the strained liquor in a water-bath down to 2½ pounds, and to add six pounds of refined sugar, so as to make a syrup. This syrup is prepared, according to the Edin. Pharm. by macerating one pound of the fresh petals of the *rosa centifolia*, or, as it is erroneously denominated, damask rose, in four pounds of boiling water for 12 hours, and adding three pounds of refined sugar to the strained liquor, and boiling so as to form a syrup. This syrup, in doses of a spoonful, or from f ʒij to f ʒxij or more, is found to be pleasant and useful as a laxative for children, or to obviate costiveness in adults.

The *ROSE-Water*, *Aqua rosæ*, (Lond. and Dub. Ph.), *Aqua rosæ centifolia* (Edin.) is prepared by taking 8lbs. (Lond.), 6lbs. (Edin. and Dub.), of the petals, and pouring over them as much water as will prevent empyreuma during the distillation; and then distilling a gallon (Lond. and Dub.), or 10 pounds (Edin.) This water has the agreeable odour of the rose in great perfection, when properly prepared; but it is very apt to spoil, unless it be rectified by a second distillation. As it is free from acrimony, and, except in point of odour, does not differ from distilled water, it is generally employed in collyria, with acetate and superacetate of lead, and acetate and sulphate of zinc. The oil and water, obtained by distillation, and used chiefly in perfumes and flavouring materials, are recommended by Hoffman as excellent cordials for raising the strength and spirits, and allaying pain. They appear to be of a mild nature, and not liable to heat or irritate the constitution. Rose-water is, however, in great esteem throughout the East, particularly in China and Persia, where the trade of it is very considerable. The rose-leaves, remaining at the bottom of the still, are kept under the name of rose cakes for a perfume.

The flowers of the *Rosa gallica*, or red officinal rose, give out their virtue both to water and rectified spirit, and tinge the former of a fine red colour, but the latter of a very pale one. The extract obtained by inspissating the watery infusion is moderately austere, bitterish, and subsaline. The spirituous extract is considerably stronger both in astringency and bitterness. Water at 212° extracts both its odour and taste; and the infusion strikes a black with sulphate of iron; and also forms a precipitate of a dark colour with sulphate of zinc. The red rose is astringent and tonic. It forms an useful and elegant vehicle for the exhibition of mineral acids, nitrate of potash, and other neutral salts, in hæmorrhages and some other diseases. It has been said, that the flowers of this species possess neither the fragrance nor the laxative power of those of the *centifolia*; but Poterius, cited by Lewis, relates, that he found a drachm of powdered red roses occasion three or four stools, and this not in a few instances,

instances, but constantly in several. Its fragrance is improved by drying; and both the astringency and the colour of the petals are best preserved by hasty exsiccation. Its flowers are chiefly valued for their astringent qualities, which are most considerable before the petals expand, and, therefore, in this state they are chosen for medicinal use, and ordered by the pharmacopœias in different preparations, as those of a conserve, a honey, an infusion, and a syrup. These preparations, especially the first and second, have been highly esteemed in phthisical cases, particularly by the Arabian physicians; who mention some in which they were effectual remedies. The case of Kruger, related in the German Ephemerides, has been thought a more evident proof of the efficacy of the conserve of roses in phthisis pulmonalis; but as the use of the conserve was commonly joined with that of milk and farina-cæa, together with proper exercise in the open air, it has been doubted if these recoveries could be wholly imputed to the roses, though their mild astringent and corroborant virtues certainly contributed much. In some of the cases above alluded to, 20 or 30 pounds of the conserve were taken in the course of a month.

The *Confectio rosæ gallicæ*, confectio of the red roses of the Lond. Pharm. is prepared by beating a pound of the unblown petals of the red rose, freed from the claws, in a stone mortar, and adding three pounds of refined sugar, and then beating again until the whole be thoroughly incorporated. The Edin. Pharm. directs the unblown petals of the red rose to be beaten to a pulp, and during the beating to add three times their weight of refined sugar. The *Conserva rosæ*, or conserve of roses of the Dubl. Pharm. is prepared by beating the unblown petals of the red rose, freed from their claws, and adding gradually three times their weight of refined sugar. The confectio of the red rose possesses a small degree of astringency, and is sometimes given dissolved in new milk as a tonic in early convalescence from acute diseases; but its chief use is to form a pleasant vehicle for more active medicines.

Mel Rosæ, or rose honey. See HONEY.

Infusio of Rosæ. See INFUSION.

Syrup of red roses, *Syrupus rosæ gallicæ*, is prepared, according to the Edin. Pharm. by macerating seven ounces of the dried petals of the red rose in five pounds of boiling water for 12 hours, then boiling a little and straining; and adding six pounds of refined sugar to the strained liquor, and again boiling a little so as to form a syrup. This syrup is a weak astringent; and as such is added to astringent and stomachic infusions and gargles: it is useful in hæmoptysis and some other hæmorrhagic complaints as a gargle, and its efficacy chiefly depends on the acid; but it is principally valued on account of its flavour and colour. Lewis Mat. Med. Woodville Med. Bot. Thomson Lond. Disp.

ROSES, *Essence of*. There is scarcely a more valuable perfume in the world, than the essence of damask roses, and scarcely any thing is obtained from its subject with more difficulty, and in less quantity. All essences or essential oils are, while in the plant, contained in certain vesicles lodged in different parts, and of different structure; these vesicles are in the rose particularly small and tender, and are placed very superficially; the consequence of this is, that there is originally but a very little of this essence in the flower, and this is the very subject that will be dissipated and lost when the flowers are gathered and thrown in a heap together, as they are succulent, and very quickly heat in lying together. To avoid all dissipation and waste of this choice essence, the roses should be thrown into the still as soon as gathered, and distilled with very little water, and

that in a balneum Mariæ; then the fire is to be continued so long as the flowers float separate about in the water; but as soon as ever they form themselves into a cake, and flick to the bottom, the distillation should be finished, as they then yield no more essence. With all these precautions, however, it is with great difficulty we can procure any essence of roses. What we obtain by this distillation being chiefly a very odoriferous and fragrant water. In the warmer countries the same caution affords a larger quantity of oil, which may be separated and preserved under the name of the essence. In Italy, they make some quantity of it, but there it is very dear; a vast quantity of the flowers yielding only a very little essence, and that being thick and troublesome in the procuring, as it every where sticks to the vessels.

It is to be observed, that the season of the year as to wet or dry, makes a very great difference in the essential oils of all plants; they are always much finer in dry and hot seasons, than in cold and moist; we find our rose-water in England much finer, and more fragrant, though distilled in the same proportion, in hot and dry summers, than in cold and rainy ones; and Mr. Geoffroy gives an account that he succeeded, one very hot and dry year, in the making essence of roses in France in the following manner.

As the roses were brought to him fresh gathered, he turned them immediately into the still; and drawing over the water into a glass matras, when it had stood by some time, and was perfectly cold, he discovered some of the essence fixed to the sides of the matras, and the surface of the water covered with a thin reticular pellicle. All the contents of the matras were put to filter through a paper, supported by a fine linen cloth; and the filtrated water was added to new roses for many succeeding distillations, the produce of which was all filtered through the same paper. After a long course of distillations, with fresh flowers every time, but still with the same vessels and the same water, there was found in the paper of the filtre a quantity of thick essence; this being carefully washed out of the paper, with a small quantity of the most fragrant of the water, and afterwards separated pure from its surface, was very white and extremely fragrant, and as thick as fine butter. This is not the only essential oil which naturally concretes into this firm state; oil of aniseed, though fluid when distilled, always concretes in the same manner on the first approach of cold; and another oil of this kind is that of the laurel, which is used in some places, though very improperly, to give the scent and taste of bitter almonds, or apricot kernels, to foods of different kinds.

Monsieur Homberg has taught us how to gain a larger quantity of the essential oil of roses than in the usual distillation, by the previous addition of mineral acids, as the spirit of salt, vitriol, &c. thereto; which increase the fermentation, and joining with the oil, render it more liquid, and easier to be raised by heat. He advises a perfumer (who before scarcely obtained an ounce of oil from a hundred weight of roses) to steep his flowers, for fifteen days, in water made sharp with the spirit of vitriol; by which means the perfumer, upon distillation, found his quantity of oil increased almost a third.

The perfumers keep the structure of the vessel they employ in this distillation a great secret. M. Homberg tells us, it is a large convenient still, that opens in a tube at the top to receive the water, which must often be poured upon the roses, to bring over the oil with it; this it does but very slowly, and so requires that its quantity be large; the still also opens below, that the flowers, when they will yield no more oil, may be easily taken out; but the principal contrivance

contrivance is the figure of the vessel which receives the oil; this is made like an ordinary matras, from the lower part of the belly of which comes a tube, as from an old-fashioned cruet, and rising to the bottom of the neck of the receiver, it bends outward; so that though the vessel usually contains but two or three French pints, it conveniently receives and lets pass many hundred pints of the rose-water, without any necessity of being changed; for a change would lose the small quantity of the oil obtained. The water distilled runs through a pipe into a second receiver; the oil, being lighter than the water, floats upon its surface, and adheres to the neck of the vessel, as high as the aperture of the little pipe, while the water runs from the bottom of the first receiver into the second. See *Mém. de l'Acad. des Sciences*, 1700.

M. Homberg observes, that this still may be useful to draw off any kind of precious essential oils.

The process for making attar, or essential oil of roses, so much esteemed as a perfume, is related in the "*Asiatic Researches*," (vol. i. p. 332.) by lieutenant-colonel Polier, and is as follows. "Forty pounds of fresh roses, with their calyces, but the stems cut close, are put in a still with 60 pounds of water. The mass is then well mixed together with the hands, and a gentle fire is made under the still. When the water begins to grow hot, and fumes to rise, the cap of the still is put on, and the pipe fixed; the chinks are then well luted with paste, and cold water put on the refrigeratory at the top. The receiver is also adapted at the end of the pipe; and the fire is continued under the still, neither too violent nor too weak. When the impregnated water begins to come over, and the still is very hot, the fire is lessened by gentle degrees, and the distillation continued till thirty pounds of water are come over, which is generally done in about four or five hours. This rose-water is to be poured again on a fresh quantity (forty pounds) of roses; and from fifteen to twenty pounds of water are to be drawn by distillation, following the same process as before. The rose-water thus made and cohobated, will be found, if the roses were good and fresh, and the distillation carefully performed, highly scented with the roses. It is then poured into pans either of earthen-ware or of tinned metal, and left exposed to the fresh air for the night. The *attar*, or *essence*, will be found in the morning congealed, and swimming on the top of the water. This is to be carefully separated, and collected, either with a thin shell or a skimmer, and poured into a vial. When a certain quantity has thus been obtained, the water and feces must be separated from the clear essence, which, with respect to the first, will not be difficult to do, as the essence congeals with a slight cold, and the water may then be made to run off. If, after that, the essence is kept fluid by heat, the feces will subside, and may be separated; but if the operation has been neatly performed, these will be little or none. The feces are as highly perfumed as the essence, and must be kept after as much of the essence has been skimmed from the rose-water as could be. The remaining water should be used for fresh distillations, instead of common water; at least as far as it will go.

"The above is the whole process of making genuine attar of roses. But, as the roses of this country give but a very small quantity of essence, and it is in high esteem, various ways have been thought of to augment the quantity, though at the expence of the quality. In this country it is usual to add to the roses, when put in the still, a quantity of sandal-wood raspings, some more, some less, from one to five tolahs, or half ounces. The sandal contains a deal of essential oil, which comes over freely in the common distilla-

tion, and mixing with the rose-water and essence, becomes strongly impregnated with their perfume. The imposition, however, cannot be concealed; the essential oil of sandal will not congeal in common cold; and its smell cannot be kept under, but will be apparent and predominate, in spite of every art. In Cashemire they seldom use sandal to adulterate the attar; but I have been informed, to increase the quantity, they distil with the roses a sweet-scented grass, which does not communicate any unpleasant scent, and gives the attar a high clear green colour. This essence also does not congeal in a slight cold, as that of roses."

The quantity of essential oil to be obtained from the roses is very precarious, as it depends not only on the skill of the distiller, but also on the quality of the roses, and the favourableness of the season. In order to obtain 4 mashes (about $1\frac{1}{2}$ drachm) from 80 pounds, which, deducting the calyces, amounts to something less than 3 drachms *per* 100 pounds of rose-leaves, the season must be very favourable, and the operation carefully performed. The colour of the attar of roses is no criterion of its goodness, quality, or country. In the year 1787, Col. Polier had attar of a fine emerald green, of a bright yellow, and of a reddish hue, from the same ground, and obtained by the same process, only of roses collected at different days. The calyces, he observes, do not in any degree diminish the quality of the attar, nor impart any green colour to it; though perhaps they may augment the quantity; but the trouble necessary for stripping them must, and ought, to prevent its being ever put in practice.

ROSES, *Oil of*. See ROSE, and the preceding article.

ROSE-Fly, in *Natural History*, the name given by authors to a peculiar species of fly, found very frequent on rose-bushes, and produced out of a bastard caterpillar, which feeds on the leaves of that tree. See CYNIPS.

The male of this fly has a long body, the female a short and thick one; she deposits her eggs in small holes, which she makes in the bark of the young branches, and for this purpose is furnished with a very remarkable instrument, placed at the hinder part of the body, which is a kind of saw.

This is a four-winged fly, and is so common on rose-bushes, that it is scarcely possible to miss it in any of the summer months; and the parts of the branches where it has deposited its eggs are so vitiated by it, that they also are easily known. They are usually swelled to a greater bigness than either the part above or below them, and are usually somewhat bent; they are often black on the under side, and among this blackness the holes made for the eggs, and often the eggs in them, may be seen. The head and breast of this fly are black; its wings also are edged with black, its body is yellow, and its legs yellow, with a few black spots.

If these flies be observed in a summer morning, as they are crawling on the branches of a rose-tree, they will soon be found at work for the depositing of their eggs. These creatures give us a very good opportunity of observing the manner in which they perform this, as they are of a very sluggish disposition, and will stand still even to be taken between the fingers; so that when one of them is in a proper situation, it may be examined by bringing the eye near it, and by using the common magnifying glasses, without quitting its place or its work; and if there be leaves of the tree, or small branches of it in the way, they may be removed without disturbing the creature. Reaumur's *Hist. Inf.* vol. ix. p. 145.

There is, besides this species, another fly of the same genus, produced from a bastard caterpillar of the rose-tree, and of the same shape and structure of parts with this, but different

different in colour. The head and breast of this fly are of a deep violet colour, the body is yellow, and the legs and wings are of a somewhat paler violet tinge. This creature also deposits its eggs in holes made in the branches of the rose-tree, by means of a double saw, placed at the hinder part of the body; but, as the former species lays them in a single straight line, this disposes them in a very beautiful and very regular manner in two rows.

Rose-Galls, a name given by authors to certain unnatural productions of the *rosa sylvestris*, or dog-rose, occasioned by the bites of insects. There are two kinds of these, the one very common, the other more rare.

The scarcer kind is usually found on the young shoots, and on the hews, or fruit, and is of a woody substance; the other is hairy and spongy, and is found on the old branches. The woody kind usually appears in the months of June and July, and is always found in clusters. These are composed of ten, twelve, or more galls of different sizes and figures, some round, others oblong, some of the size of an olive, and others not larger than a pea. They are of the common substance of the white wood, or blea, of trees, and when situated on the fruit, they prevent its ripening, and make a very singular figure. They are of a reddish colour, and are usually smooth and glossy, but sometimes they are beset with short and fine prickles.

The hairy rose-gall is too common, and too singular a figure to have escaped the observation of persons in all ages; it has been introduced into medicine in many parts of the world, and is at this time prescribed in Germany, when reduced to powder, in diarrhoeas, dysenteries, and other disorders of the bowels, and to promote urine and break the stone.

These rose-galls, though they appear at first sight composed of tufts of hair, are, however, in reality, made up of several small galls, growing from a bud on the branch, and forming a cluster on the part. They are of an oblong figure, and resemble the shape of a plum-stone. Each of them is the habitation of a single worm, each having one cell in the centre.

All these galls of the rose-tree afford the same species of worms and flies. The proper inhabitants, however, are hardly to be distinguished by the most curious observer from the great variety of species which are found in them, all produced of the eggs of other flies, whose worms are of the carnivorous kind, and are lodged in the gall, not to feed on the juices of the tree, but on the flesh of the proper inhabitant. When the parent-fly, who gives origin to the galls, has deposited her eggs, and the tumour, in consequence, begins to be formed, an enemy of this kind pierces the covering, and sends in her offspring to feed on the inhabitant. These are flies of the ichneumon kind, and several species of them are of great beauty. All the flies described by authors as issuing out of this gall seem to have been of this kind; the proper inhabitant, being a small black fly of no great beauty, is disregarded, while the others have been particularly described.

Mentzelius has given an elegant account of a species whose back is of a fine blue, and its belly purple; and others have figured and described greenish and gold-coloured ones; but these are all ichneumons, all bred of devouring enemies which have fed on the proper inhabitants of the galls, and lived and transformed themselves in their cells.

Rose-Wood, *lignum rhodium*, or *asphaltum*. See ASPHALTH.

Rose Pink. See PINK.

Rose, Golden, is a rose which the pope blesses at mass, on the first Sunday in Lent, while they sing *Lætare Jeru-*

salem; and which, after mass, he carries in procession; and then sends as a present to some sovereign prince.

ROSE, the factions of the red and white, are famous in our English histories. They had their rise in 1454, under Henry VI. between the houses of York and Lancaster, and ended in Henry VII. who united the two branches. The house of Lancaster had for its badge a red rose; that of York a white one.

ROSE, in Architecture and Sculpture, an ornament cut in resemblance of a rose.

It is chiefly used in friezes, corniches, and vaults of churches, and particularly in the middle of each face of the Corinthian abacus. And in the spaces between the modillions, under the plafonds of corniches.

ROSES, in Heraldry, is a difference denoting the seventh son of a family.

ROSE-Nails. See NAIL.

ROSE-Diamond. See DIAMOND.

ROSE-Noble, an ancient English gold coin, first struck in the reign of Edward III. when the series of gold coinage commences, and then called the *penny of gold*; since called *rose-noble*, because stamped with a rose. It was current at 6s. 8d., and consequently formed half a "mark," so called as being a grand limited sum in account (Marc, *limes*, Goth.), 3 oz. in weight, and $\frac{2}{3}$ ds of the money pound. This, as one half of the commercial pound of 16 ounces, is sometimes called "selibra." The noble (which see) was so called from the nobility of the metal, being of the finest gold then, or now, used in the world for coinage; and it was attended by its half and quarter; the proportion of silver to gold being then 1 to 11. This coin was sometimes called the "rose-noble," from both sides being impaled in an undulating circle, resembling the outline of an expanded rose, together with its half and quarter; and these continued the only gold coins till the angels of Edward IV. 1465, stamped with the angel Michael and the dragon, and the angelets, equal to half the angel, or 3s. 4d. were substituted in their place. Antiquaries likewise assert, that gold being scarce in Henry Vth's time, that prince diminished the noble, retaining its former value; but that Henry VI. restored it to its size, and caused it to pass for 10s. under the new name of ryal. Accordingly, the noble of Henry V. weighs only 108 grains now, while those preceding his reign weigh 120. This speaks gold to have increased in value about 10 per cent. The old noble of Edward III. and Richard II. at 120 grains, passed but for 6s. 8d.; but in the fifth year of Edward IV. 1465, the angel was of equal value, though but 80 grains in weight; which shews gold to have increased in value then no less than 30 per cent. Certain it is that the ryal of 10s. and the angel of 6s. 8d. with their divisions of half and quarter, were the sole gold coins till, in 1485, Henry VII. published the double ryal, or sovereign, of 20s. accompanied by the double sovereign, of 40s. See MONEY.

ROSE Engine, Rose lathe, or Figure lathe, in the *Mechanic Arts*, is a machine used for turning any articles in wood, ivory, or metal, in the same manner as a common lathe, but it has additional parts, by which the surface of the subject which has been turned, can afterwards be engraved with a great variety of patterns of curved lines, which, in general, are denominated from the French *rosette*, from a slight general resemblance which they have to a full-blown rose, and hence the machine is called a rose engine.

This machine, as we have said, contains all the parts of the *lathe*, (see that article,) and in the same manner as in turning, the work is caused to revolve, whilst the cutting tool is kept stationary; but the difference between the rose lathe

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lathe and the common lathe is, that in the former the centre of the circle, in which the work revolves, is not a stationary point, but a slight motion is given to the centre whilst the work is revolving upon it, the tool being all the while stationary; the surface of the figure which it forms will be, of course, out of round, *i. e.* it will deviate from the circular figure as much, and as often, as the motion is given to the centre.

The art of turning curiosities in wood or ivory, is one of those which is best adapted, of any of the mechanic arts, as an amusement for persons who either have leisure to apply to such subjects, or who require relaxation from mental studies: it has long been a favourite pursuit of many gentlemen, and the machines they employ are very ingeniously constructed. The curious in this art reckon two points of perfection in their works, one where the extreme delicacy, or elegance, of the object renders it admirable, and the other is considered from the difficulties of the execution; the former may be judged by all persons possessed of good taste, but to judge of the latter requires some knowledge of the art, or, at least, so far as to know that the lathe will form only such articles as are perfectly circular, all the parts having a common axis; therefore the specimens of turning are to be more or less esteemed, in proportion as they are more opposed to the circular figure. This art was more cultivated a hundred years ago than at present, and more curious specimens were then produced, such as hollow balls of ivory, containing many excentric figures, formed within each other, all being cut from the same solid piece, and every one beautifully ornamented upon the surface, although only small holes were left through them to gain access to the interior ones: this was carried so far as to form twelve balls of ivory one within the other. A great collection of curiosities of this kind will be found in a French work entitled "Résumé d'Ouvrages Curieux dans le Cabinet de M. Grollier de Servir," 4to. Lyons, 1719. This contains drawings of some very curious articles; but although the art is not so generally practised at the present day as formerly, the machines which are now invented are vastly superior, and, with the same attention, would doubtless admit of the curiosities being equally extended. Messrs. Holtzapffel and Deyerlien, of Cockspur-street, London, have made many improvements in the construction of rose engines, which they execute, as well as all other tools, for ornamental turning, in the most finished style. We have obtained drawings of one of these, see *Plate III. Engines*, in which *fig. 6.* is an elevation in front of the machine. A A B B is the wooden frame; D, the large foot-wheel, to give motion to the mandrel, or spindle, T T, by the band and pulley F. The work is fixed in a chuck I, at the extremity of the mandrel; and the tool is held by the slide-rest K, which, though it has the means of moving the tool a small quantity, to adjust it to the radius of the rose, or figure intended to be cut, still it will firmly retain the position in which it is placed. The upper part, A, of the frame of the machine is made of mahogany, but has within it a cast-iron frame, consisting of two bars, or bearers, which being placed parallel, and at a small distance asunder, leave a groove or opening between them, in the same manner as the cheeks of any other lathe, for the reception of the tenon, at the lower end of the back puppet (shewn by the dotted lines) L, which is used to support the end of a long piece of work; though this is seldom used, because the work can only be turned circular, when the back centre supports it. All work which is to be figure-turned must be held in a chuck, screwed on to the end of the mandrel T; because it is only the mandrel which is moveable, to give those deviations from the circular figure, which are necessary to form the

figured work. For this purpose, the two standards, G and H, which support the mandrel, are not firmly fixed to the bed, A, of the machine, as in other turning-lathes; but they descend between the cheeks or cast-iron bed, almost as low as the bottom of the mahogany bed A, and have there an axis P (dotted), which is parallel to the mandrel, and supported on pivots at its ends; these pivots being received in pieces of cast-iron, descending from the cheeks, and strengthened by the iron bar, Q, extended between them. The two standards, G, H, are formed of one piece, and have a strong bracing of iron between them, in addition to the axis P; but this cannot be seen in the figure, because it is concealed between the cheeks of the bed O. The oscillating motion is given to the mandrel by means of metal rosettes M: these are wheels, fixed upon the mandrel, each having its periphery indented and curved with a waving line, as shewn at M, *fig. 7.* The rosettes are acted upon by a small roller, placed at the end of a piece n, which is supported by a triangular bar m, fixed parallel to the mandrel, upon the upper ends of curved arms, as shewn in both figures. Now it is evident that when the mandrel revolves, the eminences and depressions of the rosette, applying themselves to the roller of the piece n, which is stationary, will cause a vibrating or oscillating motion of the mandrel, and the frame, G H, which contains it. A strong spring is placed within the cavity of the bed A, and applied to the frame of the mandrel; so that it inclines the latter always towards the central or vertical position, that is, the position, when the line of the mandrel is produced, would pass exactly through the point of the screw of the back puppet L; therefore, when the protuberant or waved parts of the rosette causes the mandrel to depart from this situation, the spring will be bent, and ready to force it back, the instant the curvature of the rosette will permit. The spring is slightly curved, and placed in the space between the insides of the iron cheeks of the bed and the frame of the mandrel, so that the middle of the curved part acts thereupon, and the two ends bear against the inside of the frame, to give the re-action. Seventeen different rosettes are placed upon the mandrel, as shewn in a cluster at M, each being of a different pattern. Several are of the kind shewn in *fig. 7.*, that is, scolloped out with waves or concave depressions, but differing in the number of waves from 12, as in the figure, to 144, which will, therefore, be very minute. The socket for the piece n can be fixed, by its clamp screw, upon any part of the triangular bar m, to bring it opposite any one of the rosettes which is required to be used. Other rosettes, instead of having waves or concave depressions, as shewn in *fig. 7.*, have convex protuberances. In either case, when the pattern is very fine, the roller upon the end of the bearing-piece, n, cannot be admitted, because its curvature would not be sufficiently rapid to suffer it to fall into the depressions. In these cases, therefore, the end of the piece n is used for the contact, being rounded, and well hardened and polished, to diminish as much as possible the friction of the rosette revolving, whilst in contact with it.

The slide-rest, which supports the tool, is next to be described: the manner in which it applies to a piece of work, when fixed in a chuck at the end of the mandrel, is shewn in *fig. 6.*, whilst *figs. 11 and 12* are on a larger scale to describe it minutely. The rest can be fastened at any part of the bed, by the lower part of the foot, which is supported on the bed, A, of the lathe, and is divided with a dove-tailed groove in the under side, to receive the head of a screw-bolt, going down through the lathe-bed, and fixing it at any place by a thumb-nut, as shewn at k, *fig. 6.*; the groove in the foot is for the purpose of allowing the rest to be moved to and from the

centre

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centre of the lathe, to adjust it to the diameter of the work which is turning. The foot has a strong cylindrical pin fixed upright in the end of it, and this is fitted into a corresponding socket S, formed out of a solid piece, with the lower slider K of the rest; a clamp-screw in the side fixes the socket fast upon the pin, and there is a wheel *s*, cut with notches, at the bottom of the socket, with a catch *t*, fixed upon the foot R, to engage its teeth and hold it fast; by which means the sliders, K, can be fixed, and held fast at any required angle with the mandrel, for purposes we shall hereafter mention.

The upper part of the slide-rest consists of two horizontal sliders, K and *g*, placed in directions perpendicular to each other; to one of these the tool is firmly attached, and by means of screws with handles, the sliders and the tool can be moved in any direction, to follow the tool to the work; K, in both figures, is a frame of metal, formed from the same piece as the socket S; its upper surface is made flat, and upon this a slider, or flat plate, *ee*, is fitted, to move with freedom and precision. A screw is mounted in the opening of the frame, and is tapped into a piece of metal, projecting from the lower side of the slider, so that the screw, when turned round by a handle *d*, fitted on its square end, advances, or draws back the slider, which is guided in a right line by two pieces of brass, screwed to the under side of it, to form a dove-tailed groove, to which the edges of the frame K are fitted very accurately: upon this slider a frame, or two rulers, are screwed, having a second steel slider *g*, fitted in the dove-tailed groove formed between them, and provided with a screw *i*, as the former, to move it. This upper slider carries a piece of metal, with a square hole through it, in the direction of its length, to receive the tool *k*, and a screw at top to fasten it in. The slide-rest being mounted in the manner of *fig. 6*, upon the bed of the lathe, the upper slider, *g*, is parallel with the mandrel, and the lower one perpendicular thereto. For turning flat or face work, the tool is put as there shewn. Now, by turning the screw, *i*, of the upper slider, the tool advances to a contact with the work, which is mounted in a chuck, as in the figure; then by the other screw, *d*, it is moved across the face of the work, turning it as it proceeds to a perfectly flat surface. For turning a cylinder, mounted between centers, the slide-rest is to be turned one quarter round upon the pin in the socket S, so that the upper slider will be perpendicular to the mandrel, and the lower one parallel thereto; in this case, the upper slider must be moved, to adjust the tool to the diameter of the intended work, and the lower slider is moved by its handle *d*, to carry the tool along the length of the cylinder, and cut it as it goes. The whole rest can be fixed at any part of the bed, and can be moved instantly if required. The slide-rest will also turn cones by the following contrivance: the plate, or dove-tailed groove supporting the upper slider, *g*, may be turned round upon the plate *ee*, and fastened at any inclination by a screw passing through a circular groove in the plate. By this means, the upper slider is inclined, in any required angle, to the mandrel, and will then turn a cone, either hollow or solid. The slide-rest presents the tool so firmly to the work, that it will not retreat in the least when any protuberance comes by, but cuts it away, if the strain is not so great as to break the tool: but of this there is no danger if it be properly managed, because the screws advance the tool so slowly, that there is no need to push it forwards suddenly, as it is often unavoidable in turning by hand. The sliders are often divided into inches and subdivisions, by which the work can be made exactly to any dimensions without trouble, or two things may be fitted exactly together. The upper slider, *g*, has a graduated arc to

shew the angle of inclination which it makes with the lower one, when set for turning cones, so that a hollow cone being bored out in a chuck, a solid plug may at once be turned to fit it, without trial, the rest making it certainly of the true angle.

The lathe is put in motion either by the hand, or by the foot of the turner. The latter, when the work is to be turned or reduced to the circular figure, as in any common lathe; and the former, when the work, after being turned, is to be ornamented, an operation which, from its delicacy, requires a very regular motion.

When the machine is turned by the foot, it is done by the pressure upon the treadle E, which acts upon the crank C, on the axis of the foot-wheel, or fly-wheel, D. The motion is communicated from the treadle by a crank-hook, or connecting rod, *a*, fastened to the crank of the wheel, by a collar embracing and turning round at the upper end. When the foot pushes down the treadle, it gives the wheel a rotative motion; and when the crank has been drawn to the lowest point, the momentum which the wheel has thus acquired, draws up the treadle, and thus, by the alternate pressure of the foot, and the momentum of the wheel, the motion is regularly continued. The wheel is made of cast iron, and fixed on the extreme end of the axis; it has two rims of different sizes, and the surface of each is made conical, and cut with three annular grooves, which are recessed, with an angle at the bottom, so as not to have a flat bottom. This form is advantageous, on account of the band having more power to turn the wheel F. These different grooves are made, in order to give different degrees of velocity to the lathe, or to increase the power. The axle of the wheel is made of wrought-iron, except the pivots or centers, and it is bent in the middle to form the crank C: the pivots at the ends are made of hard steel, welded to the iron parts of the axle. The band which connects the fly and mandrel is made of catgut, of such thickness as the nature of the work may require, and is either spliced at the joining of the two ends, or they are fastened together by a steel hook and eye. The band may be either tightened, by shifting it to other grooves in the great wheel, or in the pulley F, of the mandrel; or otherwise by a sliding-piece in the leg B, which is regulated by a screw *x*.

The motion for the hand is given by a small handle O, *fig. 6*; this is fixed upon the end of a spindle, which at the other end carries a small wheel N, communicating by a band with the great wheel D. The spindle is supported in a frame, which is attached to the lathe-frame, by a centre or joint, on which it can be raised up, and fixed by a toothed sector, to tighten the band when it is required.

The pulley F has three or four grooves, of different sizes, to receive the band, and by this means the mandrel may be turned with different degrees of velocity, and made to accommodate itself to the length of the band. The wheel N is made in the same manner.

When a piece of work is to be made in the rose engine, it is first turned true to the size and figure, and then polished, before it is ornamented: therefore the machine is first set to turn circular. For this purpose, the piece *n*, *fig. 7*, is withdrawn, so as to be beyond the reach of the rosette, and a head at *z*, *fig. 6*, being turned, it shoots a double bolt, which locks the frame G H fast in its perpendicular position; that is, when the point of the back centre-screw L will be exactly in the line of the mandrel, the frame being thus rendered immoveable, the machine will turn the same as any common lathe. If the work is of considerable length, it must be supported at the end by the back centre L, at least whilst it is turned circular, previous to being ornamented.

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The back puppet, *L*, is made of cast-iron, and is fitted upon the cast-iron bearers, on which it can be fixed at the required distance from the mandrel by a vertical screw underneath, and a nut, which comes in contact with a horizontal plate or washer below the said bearers. Its centre-screw has a sharp conical point to support the work, and there is a clamp-screw at top to fasten the centre-screw, to prevent it from running haek.

The methods of fixing the work to the end of the mandrel whilst it is turned are very numerous, and vary in almost every instance: in general, it is held in a piece of wood, *L*, called a chuck, which is screwed upon the nose of the mandrel *T*, and being bored, or turned out in the manner of a cup, the piece of wood or ivory which is to be turned is driven into it by a mallet till it is firmly fixed: the wood is, of course, cut nearly to a circular figure, before it is fixed in the chuck; it is then wrought with a sharp triangular pointed tool, *b*, which being fixed in the rest, and advanced to the work by the screw *i*, cuts small contiguous grooves on the surface, till it has broken the grain of the wood, and removed all exuberances. The tool being gradually advanced by its screws *d* and *i*, as is required, the work is reduced at length nearly to its intended size and figure, but will be wholly covered with small grooves: to remove these, and render the work even, another tool is next used; this is formed like a narrow chisel, but made very thick, and with an obtuse edge, which is only bevelled on the under side: its edge will remove the eminences between the grooves left by the first tool. The work is then smoothed, by applying to it the edge of a piece of the blade of a broken knife bevelled away; this is held in the hand, and the work is followed up with it, that its sharp edge may scrape away any roughness left by the tools. To polish the wood, a piece of seal-skin, Dutch reed, or glass paper, is held by the hand upon the work as it runs round, and it cuts away a fine powder, making the work smooth enough to receive a polish. This is raised by first applying a piece of bees-wax, till the work is slightly covered with it, then afterwards burnishing or polishing it, by holding a flat piece of hard wood upon it. The finish can be given by the friction of a coarse woollen rag, lightly smeared with olive oil.

Ivory is turned nearly in the same manner, but is polished with chalk and water, and afterwards by the friction of a woollen cloth; or, if it is first touched with an oily rag, and rubbed off with a dry woollen cloth, it will have a very fine surface.

This is only the same process as is used for ordinary turning; but when the work is finished in this manner, the ornamenting is began by releasing the bolt, *z*, of the mandrel-frame *G H*, and choosing the rosette best adapted to the pattern which is required. The piece, *n*, is set upon the triangular bar, to be in contact with its wave, and will thus give the oscillating motion, as before described; so that when the tool is applied to the work, it will produce a waved or indented surface, or outline, corresponding with the figure of the rosette, instead of the circular figure produced by the common lathe.

If the ornamenting is to be performed upon a flat surface, such, for instance, as the lid or top of a box, it is chucked, as shewn in *fig. 6*, and the point of the tool being applied to it, will cut a waved line. To do this more conveniently, the slider, *g*, is advanced to the work, by pressing it with the hand instead of the screw *i*; for, by lifting up a small spring catch, of which the tail is seen plainly at *z*, *fig. 6*, the slider is released from the nut of the screw *i*, which has no other attachment to the slider than by a tooth on this catch entering into a notch in the nut, and it is pressed into

the notch by a screw *l*. Now, by releasing the screw *l*, lifting up the catch *z*, and drawing back the slider, the tooth of the catch falls behind the nut of the screw, instead of being in the notch; it will, therefore, form a stop, to check the advance of the tool, though it allows it to be drawn back to clear the work, and also to be pushed up towards it by the hand, to cut the line, the stop regulating the depth of the line, as the hand can advance the slider no farther when it meets the nut.

In this manner, a waved line is engraved round the edge of it, such as is shewn in *fig. 9*, the breadth of the line being determined by the depth to which the point of the tool is regulated to penetrate, by turning the screw *i*. The outer line being thus finished, the tool is now withdrawn to clear the work, and the screw, *d*, of the great slider being turned a small quantity, the point of the tool is brought nearer to the centre of the work; here, by pushing up the tool, another line is described; then a third within the second, and so on, at equal distances, until they reach the centre: this makes a very pretty ornament, as in *fig. 9*. It should be observed, that as each line has the same number of waves, or indentations, they will necessarily grow very fine as they approach towards the centre; but at the same time as the deviation from the circular figure is equal in the smallest as well as the largest rings, it follows, that the curves of the waves of each ring, or line, will vary in a very gradual and pleasing manner, being slightly curved at the circumference, and more rapidly towards the centre. This pattern admits of great variety, by employing different rosettes, fine or coarse, concave or convex; but it will always have the waves included in straight lines directed to the centre. A very pretty variation is made by turning the rosette round upon the mandrel a very small quantity every time before a fresh line is described. For this purpose, the rosettes are not fixed fast upon the mandrel, but are fitted thereupon, so as to admit of turning round, being moved by a small screw at the end towards *H*. As an example of the use of this movement, *fig. 10* is given, which consists of a rose of twenty-four waves. In this, after drawing the exterior line, in the same manner as the former, when the slider is set for the second, the rosette is turned round upon the mandrel a quantity equal to one-fourth of a wave, or one-ninety-sixth part of the whole circle: the circle is now described, and its waves will not fall exactly within those of the former, but a little advanced therefrom. The next time a circle is to be drawn, the rosette is again shifted, and so on. As this is a quantity equal to one-fourth of the space between the waves, it is plain that at every fourth line the waves will fall in lines drawn towards the centre. Still this will not affect the appearance, which will be totally different from the former, (*fig. 9*.) and very superior to it. The concentric lines, in either of these patterns, are made exactly at equal distances, by means of the divisions before-mentioned, upon the slider *K*, or otherwise by divisions made upon a head, which is fitted upon the end of the screw *d*; and the rosettes are set exactly to the quantity they are intended to be turned round, by means of divisions made upon the edge of a circular plate, which is fixed fast upon the mandrel, towards the end *H*, and a line or mark upon the last rosette applies to it. The screw which effects the movement is supported in bearings upon this plate, and acts in the teeth of a wheel, fixed within the hollow of the last rosette. By this means, when the screw is turned round by a key, it causes all the rosettes to turn round together any quantity which the divisions on the circle indicate. On this principle, great varieties of patterns may be made, and they may be greatly diversified by shifting the rosettes alter-

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nately in contrary directions: thus, after eight, twelve, or any other number of rings have been drawn, by gradually shifting them each time, as before described. By reversing the shifting movement to the opposite direction, a total change will be produced; and continuing in this manner for eight or twelve more circles, the rosettes are again to be advanced in the first-mentioned direction, and continued for eight or twelve. This method produces a curious effect, and admits of much variety in the patterns.

After having drawn a waved line, the rosette may be advanced half a division, and then another line drawn, without altering the slide-rest. By this means, the two waved lines will intersect each other, and make a number of loops like a chain of beads. A number of concentric lines of this sort, drawn upon a circle, is very handsome.

We have now shewn the principal distinctions of the patterns which can be described upon a flat surface; but it is evident, that from the number of the rosettes, a very numerous suit of curious combinations can be made. An elliptical and an excentric chuck are adapted to this machine, to screw on at T: a new field is thus opened, which is so extensive as to exercise constantly the taste and fancy of the operator, in producing new combinations, and renders the machine a source of the most interesting amusement. The elliptical and excentric chucks, when applied to a common lathe, will form a great many interesting patterns, but are vastly more extensive with the rose engine. Their construction will be described under TURNING. It is sufficient here to say, that by the elliptical chuck, the waved lines may be drawn in ellipses, instead of circles; and by the excentric, several small waved circles, or ellipses, can be arranged round the circumference of a larger circle, and their intersections produce a very pretty effect.

Another species of rose-turning is performed upon the surface of a cylinder, globe, or cone; whereas that which we have described is only upon the flat surface of a circular piece, or end of the cylinder. To ornament the surface of the cylinder, the slide-rest is turned round one-fourth of a circle, as before described, for forming the cylinder; so that the long slider becomes parallel to the mandrel. In this way the whole surface of the cylinder may be waved; but great care must be taken to advance the tool very gradually, because it will not cut so readily as when turning circular work. By dividing the length of the cylinder into small equal portions, and by shifting the rosettes every time one of these is finished, the waves may be made to follow each other in a spiral direction round the cylinder; or, by a proper rosette used in this manner, very elegant patterns of basket-work may be formed.

There is another movement of the rose lathe, which we have not yet described: this is called the pumping. It is principally used for describing waved lines upon the surface of a cylinder; that is, the surface is left cylindrical, but the lines are waved in the direction of the length of the cylinder, or alternately towards its ends. This is effected by making the mandrel move end-ways in its bearings: for which purpose, the necks upon which it turns are made exactly cylindrical, and fitted very correctly to steel collars, which are fixed into the standards, G, H. It has, therefore, liberty to slide end-ways in its collars, when the pumping motion is required. This is given by rosettes waved upon the edge or side, and acting against the side of a piece of steel, such as *n*, *fig. 7*. A spring, *p*, *fig. 6*, is fixed at the end of the frame, and acts against the shoulder of the mandrel, to force it end-ways, and keep the rosette always in contact with the piece of steel. The rosettes, M, are cut in a waved manner upon their sides, as well as upon

their circumferences; and thus a variety of pumping rosettes are obtained. By this means, curious waving lines may be drawn round a cylinder; or, if the motions first described are used in combination with the pumping, the surface of the cylinder may be waved, at the same time that waved lines are drawn upon it. In this case, the two rosettes employed must have the same number of waves. When the pumping motion is used upon face or flat work, such as is shewn in *fig. 6*, it produces very agreeable effects, by rendering the waves of the line, which the tool cuts, alternately deeper and shallower, so as to give fine and strong strokes alternately, in the manner of fine writing; or, if the tool is not set so deep, they will only be cut on one side of the wave, and diminishing gradually, will not be seen on the other, and thus produce a number of new patterns; as the waved lines will consist of detached strokes, cut fine at each end, and deep in the middle.

Many patterns may be cut very expeditiously in the rose engine by means of screw tools: these tools are formed like a broad chisel, but the edge is cut with notches, so as to present a number of points instead of one continued edge. These points are very exactly equidistant, being intended to cut screws; and therefore the teeth are of the proper figure to form the threads thereof. By a tool of this kind six or eight lines may be cut at one operation, instead of the trouble of altering the slide-rest, and cutting each separately; and there will be a greater certainty of cutting them all to the same depth, and exactly equidistant. The mode of cutting screws by this tool is called cutting flying, and is thus performed in the rose, or in any common lathe, without a slide-rest. The intended screw being turned cylindrical, the point of the tool are applied to its surface, so that they will cut, and the tool is regularly advanced up towards the mandrel as it turns round: its teeth will, therefore, instead of describing circles, trace the spirals of a screw on the work; and if the advancement is timed so exactly that in one revolution the tool is advanced the exact quantity of a space between two adjacent teeth, then the second tooth will, at the end of a revolution, fall into the spiral cut by the first tooth, and one complete spiral being thus obtained, it guides the whole tool, by means of the second tooth, regularly along, the first tooth continuing to cut the spiral forwards till a third tooth lays hold, then a fourth, and so on, till the required length of a screw is cut. The trace of a screw being thus made, the tool is pressed deeper, till the threads are fully formed, the turner taking care, every time, that the end-tooth of the tool gets to the end of the screw, to disengage it, and draw it back, for as it could not advance any further than the shoulder, it would spoil all the threads by cutting them to circular rings.

This method requires great habit and dexterity to give the motion so exactly that it will cause the teeth to fall properly into the spirals cut by their predecessors, and that without any sudden advance at the place, for the screw would then be what is called drunken, that is, its threads would be more inclined at one part of its revolution than at another, and such a screw can never be fitted exactly with its fellow. The habit of cutting screws accurately with the screw-tool, can only be acquired by practice and experience, the only precaution which is taken being to get the lathe-wheel into a regular motion, and at such a rate as has been found, by experience, will be proper for the size of the thread intended to be cut. The rose engine before us has a very complete apparatus for cutting screws, which deserves a particular description. A tube is fitted on the end of the mandrel at *a*, its circumference being cut with a spiral, or screw-thread of the degree of fineness required: this is called the regulator screw.

H is a slider, fitted to the standard H, and moved by a screw: r is a wheel fixed to this slider, and having several half-circle cavities cut in it, which embrace the screw, as shewn in *fig. 10*: each cavity or socket has a thread in it, corresponding with the regulator screw. The mandrel being made, as before-mentioned, with cylindrical collars at each end, is at liberty to slide endways by the movement of the regulator, when the screw H draws up the socket r ; therefore, every thing being prepared for cutting the thread, the screw H is turned; this raises up the slider, and socket r , to touch the regulator; the tool is then applied by the slide-rest, and the lathe being put in motion, the mandrel will move along endways, and also the work with it, so that the tool will cut a screw, although it is held fast by the rest. In this case the screw may be cut by a single pointed tool, but it will be better to use a screw tool which is of exactly the same thread as the regulator. The turner should be provided with a variety of sets of screw tools, and as many regulators, o , corresponding to them, which are made like a tube, and fitted on the mandrel, being held by a nut. The socket r , which is made like a wheel, *fig. 10*, can be turned round on its centre, and has six different half-circle notches cut in it, each adapted to a particular regulator; therefore, by turning this wheel, r , any of the notches can be applied to the regulator o , when the slider is raised up by the screw H. This screw regulator may be sometimes used to advantage when ornamenting the circumference of a cylinder of wood or ivory, as contiguous circles, or wavy lines, may then be cut in a spiral direction, without moving the slide-rest to cut each one separately.

Another part of the rose engine is for the purpose of turning swath work; this is circular work, but the mouldings or other lines traced round the cylinder are inclined to the axis. An instance is seen in the balustrades of old-fashioned stair-cases, where the mouldings are made to suit the inclination of the stairs. To turn this kind of work, a steel circle, or hoop, V, is fitted on the end rosette of the mandrel, so that it can be inclined from the perpendicular thereto at pleasure: by this means it forms a guide for the pumping motion, which will so regulate it as to turn any work of this kind, *viz.* with the mouldings, or other ornaments, arranged in lines round the cylinder, but these lines will incline to the axis of the cylinder instead of being perpendicular to it.

ROSE, in *Geography*, a town of Naples, in Calabria Citra; nine miles N.N.E. of Cosenza.—Also, a town of Virginia; 20 miles S.W. of Charlottesville.

ROSE ISLANDS, *Great and Little*, two small islands among the Bahamas; 12 miles N. of Providence.

ROSE ISLAND, an island in the North Pacific ocean, near the W. coast of America. N. lat. $59^{\circ} 35'$. W. long. $146^{\circ} 30'$.

ROSEA, a name given by some authors to the erysipelas, or St. Anthony's fire.

ROSEAU, in *Geography*, now "Charlotte-town," the capital of the island of Dominica, situated in St. George's parish; about seven leagues from Prince Rupert's bay; on a point of land on the S.W. side of the island, which forms two bays, *viz.* Woodbridge's bay N., and Charlottesville bay S. Roseau is about half a mile in length from Charlottesville to Roseau, and mostly two furlongs in length, but of an irregular shape. It contains more than 500 houses, besides cottages occupied by negroes. N. lat. $15^{\circ} 25'$. W. long. $61^{\circ} 27'$.

ROSECK, a town of the duchy of Carniola; eight miles E. of Gottschee.

ROSEHEARTY, a fishing town and sea-port of Scotland, in Aberdeenshire, with a tolerable harbour; for the improvement of which lord Gardenstone bequeathed by will

a considerable sum of money; four miles W. of Frazerburgh. N. lat. $57^{\circ} 38'$. W. long. 2° .

ROSEINGRAVE, THOMAS, in *Biography*, an enthusiastic, ingenious, and worthy musician, of considerable eminence in his youth for his performance on the harpsichord and organ, both as a sightman and voluntary player. His intellects, in the latter part of his life, being somewhat deranged, rendered his character so singular, that he merits some notice for his eccentricities, as well as professional abilities.

He was the son of Daniel Roseingrave, who having been brought up in the king's chapel at the same time with Purcell, was first promoted to the place of organist of Salisbury cathedral, and afterwards of St. Patrick's, Dublin. Daniel had two sons, both musicians: one of them, Ralph, succeeded his father at St. Patrick's; the other, Thomas, being regarded as a young man of uncommon dispositions for the study of his art, was honoured by the chapter of St. Patrick's with a pension, to enable him to travel for improvement; and about the year 1710 he set off for Italy. Being arrived at Venice in his way to Rome, as he himself says, he was invited, as a stranger and a virtuoso, to an academia at the house of a nobleman, where, among others, he was requested to sit down to the harpsichord, and favour the company with a toccata, as a specimen *della sua virtú*. And, says he, "finding myself rather better in courage and finger than usual, I exerted myself, my dear friend, and fancied, by the applause I received, that my performance had made some impression on the company." After a cantata had been sung by a scholar of Fr. Gasparini, who was there to accompany her, a grave young man dressed in black, and in a black wig, who had stood in one corner of the room, very quiet and attentive while Roseingrave played, being asked to sit down to the harpsichord, when he began to play, Rosy said, he thought ten hundred d—ls had been at the instrument; he never had heard such passages of execution and effect before. The performance so far surpassed his own, and every degree of perfection to which he thought it possible he should ever arrive, that, if he had been in sight of any instrument with which to have done the deed, he should have cut off his own fingers. Upon inquiring the name of this extraordinary performer, he was told that it was Domenico Scarlatti, son of the celebrated cavalier Alessandro Scarlatti. Roseingrave declared, he did not touch an instrument himself for a month. After this rencontre, however, he became very intimate with the young Scarlatti, followed him to Rome and Naples, and hardly ever quitted him while he remained in Italy, which was not till after the peace of Utrecht, as appears by an anthem which he composed at Venice in 1713, and which Dr. Tudway has inserted in the fifth volume of his Manuscript Collection of English Music, p. 149: "Arise, shine, for thy light is come," Isaiah, chap. lx. There is much fire and spirit in the introductory symphony of a very modern cast. Roseingrave is here erroneously called a student of Christ-church, Oxford, instead of Dublin, whence he had his exhibition.

On his return from Italy in 1720, he settled in London, and brought on the stage and conducted the performance of the opera of "Narciso," or "Narcissus," set by his friend Domenico Scarlatti; being the third opera that was performed in our lyric theatre, after the establishment of the Royal Academy of Music. He composed several additional songs for this opera, in which the singers were signor Benedetto Baldassarri, Mr. Gordon, signora Durastanti, Mrs. Anastasia Robinson, Mrs. Turner Robinson, daughter of Dr. Turner, and wife of Mr. Robinson, organist of

Westminster-Abbey. Roseingrave's additional songs were composed in the style of his friend Momo Scarlatti, in whose music of Narcissus, though there were many new and pleasing passages and effects, yet those acquainted with the original and happy freaks of this composer in his harpsichord pieces, would be surprised at the sobriety and almost dulness of his songs. His genius was not yet expanded, and he was not so much used to write for the voice as his father, who was the greatest vocal composer of his time, as the son afterwards became the most original and wonderful performer on the harpsichord, as well as composer for that instrument. But it seems impossible for any individual to be equally great in any two things of difficult attainment.

Roseingrave was likewise the editor of the first edition of Scarlatti's Harpsichord Lessons, in 2 vols. long 4to.

His election to the place of organist of St. George's, Hanover-square, was attended with very honourable circumstances. The parishioners, consisting chiefly of persons of rank and fortune, being very desirous of having a good organist, and unwilling to trust to their own judgment, or be teased by the solicitations of candidates of mean abilities, requested Mr. Handel, Dr. Pepusch, Dr. Greene, and Mr. Galliard, to hear the competitors play, and determine their degree of merit.

The candidates were allowed half an hour each to manifest their abilities on the organ, in whatever way they pleased, and then were severally required to play *extempore* on subjects given by the judges. Mr. Handel did not attend in person, but sent his subject. Among the numerous candidates for this place there were several who acquitted themselves very well, during the half-hour of free-agency, by playing with great neatness pieces they had probably studied for the occasion; but when subjects of fugue were presented to them for extemporaneous treatment, they neither knew how nor when to bring in the answer, or even to find harmony for the themes with either hand when they were brought in. Roseingrave, on the contrary, whose style, though too crude and learned for the generality of hearers, when left to himself, treated the subjects given with such science and dexterity, inverting the order of notes, augmenting and diminishing their value, introducing counter-subjects, and turning the themes to so many ingenious purposes, that the judges were unanimous in declaring him the victorious candidate. The late Dr. Arne and Mr. Mich. Christ. Festing, who were both present at this contention, informed us of these particulars, which happened in the year 1726, and spoke with wonder of Roseingrave as an extempore fuguist; but confirmed the general censure of his crude harmony and extravagant modulation, which indeed his printed compositions imply.

Roseingrave having, a few years after this election, fixed his affections on a lady of no dove-like constancy, was rejected by her at the time he thought himself most secure of being united to her for ever. This disappointment was so severely felt by the unfortunate lover, as to occasion a temporary and whimsical insanity. He used to say, that the lady's cruelty had so literally and completely broke his heart, that he heard the strings of it *crack* at the time he received his sentence; and on that account ever after called the disorder of his intellects his *crepation*, from the Italian verb *crepare*, to crack. After this misfortune, poor Roseingrave was never able to bear any kind of noise, without great emotion. If, during his performance on the organ at church, any one near him coughed, sneezed, or blew his nose with violence, he would instantly quit the instrument, and run out of church, seemingly in the greatest pain and

terror, crying out that it was *old scratch* who tormented him, and played on his *crepation*.

About the year 1737, on account of his occasional insanity, he was superseded at St. George's church by the late Mr. Keeble, an excellent organist, intelligent teacher, and a worthy man, who, during the life of Roseingrave, divided with him the salary. We prevailed on him once to touch an organ at Byfield's, the organ-builder; but his nerves were then so unstrung, that he could execute but few of the learned ideas which his mental disorder had left him. His sweetness of temper and willingness to instruct young persons, who were eager in the pursuit of knowledge, tempted us frequently to visit him at Mrs. Bray's, Hampstead, where he resided. His conversation was very entertaining and instructive, particularly on musical subjects. Indeed, his passion for the art never quitted him to the time of his death, which happened in Ireland about the year 1750. The instrument on which he had exercised himself, in the most enthusiastic part of his life, bore very uncommon marks of diligence and perseverance; for he had worn the ivory covering of many of the keys quite through to the wood. In his younger days, when he enjoyed the *mens sana in corpore sano*, he was regarded as having a power of seizing the parts and spirit of a score, and executing the most difficult music at sight beyond any musician in Europe. Indeed, it was said that he could read a music-book, if turned topsy-turvy; but this seems exaggeration of praise, which few can believe, who know the difficulty, without ocular and auricular demonstration. The harmony in the voluntaries, which Roseingrave published, is rendered intolerably harsh and ungrateful by a licentious and extravagant modulation, and a more frequent use of the sharp third and flat sixth than any composer with whose works we are at all acquainted, not excepting Dr. Blow; and his double fugues are so confused by the too close succession of unmarked subjects, that it is impossible, at the end of the performance, to remember what they are. His cantatas, which he published by subscription, being composed on the model of the elder Scarlatti, are the most pleasing of his works; but they were still-born, and never lived to speak in public.

ROSELLE, in *Geography*, a town of Etruria; two miles N. of Grosseto.

ROSEMARKIE, a royal borough town in a parish of the same name, in the county of Ross, Scotland, is situated on the northern shore of the Moray-frith, nearly opposite to fort George. It was constituted a royal burgh by Alexander II. king of Scotland; but in the reign of king James II. it was united with the town of Chanonry, (so called from its having been the chanonry of Ross, and the residence of the bishop,) and re-incorporated by charter under the name of Fortrose, since softened to Fortrose. For some further particulars respecting this town, see FORTROSE. Carlisle's Topographical Dictionary of Scotland, 4to. 1813.

ROSEMARY, in *Botany*. See ROSMARINUS.

ROSEMARY, *Poet's*. See OSYRIS.

ROSEMARY, *Wild, Marsh Cistus*. See LEDUM.

ROSEMARY, in the *Materia Medica*. Rosemary has a fragrant aromatic smell, and a bitterish pungent taste. The leaves and tops of this plant are the strongest with regard to their sensible qualities; the flowers are not to be separated from their calyces or cups, as the active matter principally, if not wholly, resides in the latter.

Rosemary gives out its virtues completely to rectified spirit, but only partially to water. The leaves and tops, distilled with water, yield a thin, light, pale-coloured essential

oil of great fragrancv, though not quite so agreeable as the rosemary itself; from one hundred pounds of the herb in flower were obtained eight ounces of oil; the decoction, thus divested of the aromatic part of the plant, yields, on being inspissated, an unpleasant bitterish extract. Rectified spirit likewise, distilled from rosemary leaves, becomes considerably impregnated with their fragrance, leaving, however, in the extract the greatest share both of their flavour and pungency. The active matter of the flowers is somewhat more volatile than that of the leaves, the greatest part of it arising with spirit. Tournefort observes, that those sorts of rosemary, which produce neither flowers nor seeds, and which have very hard shrubby stalks, and long narrow leaves, smell strongly like camphor, and yield on distilling a large quantity, for the purpose of obtaining their oil, a portion also of real camphor.

Rosemary is reckoned one of the most powerful of those plants which stimulate and corroborate the nervous system; it has, therefore, been recommended in various affections, supposed to proceed from debilities, or defective excitement of the brain and nerves; as in certain head-aches, deafnesses, giddinesses, palsies, &c. and in some hysterical and dyspeptic symptoms. Dr. Cullen supposes the stimulant power of rosemary insufficient to reach the sanguiferous system; it has however the character of being an emmenagogue, and the only disease, in which Bergius states it to be useful, is the chlorosis. In disorders of this kind it has been given in the form of infusion; but it is now scarcely ever prescribed, unless as an odorous additament to sternutatory powders. The dose in substance may be from grs. x to ℥ij, and from ℥j to ℥iss in infusion. The officinal preparations are the "oleum rosmarini," and "spiritus rosmarini." It is also a principal ingredient in what is known by the name of HUNGARY Water; which see.

ROSEMARY, *Oil of*, Oleum rosmarini, Lond.; Oleum summitatum florentium roris marini officinalis, Edinb.; Oleum herbæ florentis roris marini, Dub., is prepared by distilling twenty-four pounds of the plant, which yield one ounce of a fluid colourless oil, the odour of which is less agreeable than that of the plant. It deposits crystals of camphor when long kept. Its specific gravity is .934. (See OIL.) This oil is stimulant; and frequently enters into the composition of liniments. The dose, as an internal remedy, may be from ℥ij to ℥vi; but it is scarcely ever ordered.

ROSEMARY, *Spirit of*, Spiritus rosmarini (Lond.) is obtained by macerating two pounds of fresh rosemary tops in a gallon of proof spirit, with water sufficient for preventing empyreuma, for twenty-four hours, and then distilling a gallon in a gentle heat. Spiritus roris marini officinalis (Edinb.) is prepared by taking two pounds of fresh rosemary tops and eight pounds of alcohol (spec. grav. .335), and drawing off seven pounds by distillation in a water bath. Spiritus roris marini (Dub.) is obtained by distilling with a moderate fire five pints from a pound and a half of fresh rosemary tops and a gallon of proof spirit. Oil of rosemary is sufficiently volatile to rise in distillation with rectified spirit, which the Edinb. college has, therefore, directed to be used. It is a fragrant perfume; and is chiefly used in the compound soap liniment or the compound spirit of lavender. Lewis Mat. Med. Woodv. Med. Bot. Thomson's Disp.

ROSEMBERG, in *Geography*, a town of Pomerelia; 10 miles S. of Dantzic.

ROSENAU, a town of Prussia, in Oberland; 16 miles E. of Marienwerder.—Also, a town of Moravia, in the circle of Prerau; eight miles E. of Meseritsch.—Also, a

town of Hungary, near which are mines of gold, copper, quicksilver, and cinnabar; 24 miles W. of Cafchau.

ROSENBERG, a town of Prussia, in the province of Oberland; 17 miles E. of Marienwerder. N. lat. 53° 39'. E. long. 19° 10'.—Also, a town of Hungary, on the Waag, trading chiefly in salt; 18 miles N. of Libeten.—Also, a town of Bohemia, in the circle of Bechin; 37 miles S. of Bechin. N. lat. 48° 40'. E. long. 14° 18'.

ROSENBERG, or *Olesno*, a town of Silesia, in the principality of Oppeln; 26 miles N.E. of Oppeln. N. lat. 50° 52'. E. long. 18° 28'.

ROSENBURG, a town of the duchy of Magdeburg; 24 miles S. of Magdeburg.—Also, a small Dutch island, at the mouth of the Meuse; three miles E. of Briel.

ROSENDAL, a town of Brabant; 15 miles W. of Breda.

ROSENDORF, a town of Bohemia, in the circle of Leitmeritz; six miles W. of Kamnitz.

ROSENEATH, a town of Scotland, in Dumbartonshire; nine miles W.N.W. of Dumbarton.

ROSENESS, a cape on the S. coast of the island of Pomona. N. lat. 58° 45'. W. long. 2° 42'.

ROSENFELD, a town of Wurtemberg; eight miles S.E. of Sulz. N. lat. 48° 14'. E. long. 8° 43'.

ROSENGAT, a town of Germany, opposite to Worms.

ROSENHEIM, a town of Bavaria, at the conflux of the Inn and the Manguald; 38 miles W. of Salzburg.

ROSENHOF, a town of the duchy of Holstein; five miles N. of Cismar.

ROSENIA, in *Botany*, so called by Thunberg, in honour of two brothers of the name of Rosen, both eminent as physicians and botanists, one of whom is well known as the determined and jealous rival of the early fame of Linnæus, though afterwards his friend. (See LINNÆUS.) This gentleman, who died in 1773, aged 67, was professor of Medicine at Upsal: the other at Lund. They were natives of Sweden, and knights of the Polar Star.—Thunb. Prodr. præf. n. 59. Nov. Gen. diff. 12. 161. Willd. Sp. Pl. v. 3. 2134.—Class and order, *Syngenesia Polygamia Superflua*. Nat. Ord. *Compositæ Discoidæ*, Linn. *Corymbiferae*, Juss.

Gen. Ch. *Common calyx* of many leaves, imbricated; scales ovate, obtuse, undivided, smooth, transparent, with a brown, opaque, longitudinal line. *Cor.* compound, radiated; *florets* of the disk perfect, tubular, five-cleft; those of the radius female, ligulate, convolute, arched. *Stam.* (in the perfect florets) Filaments five, very short; anthers united into a cylindrical tube. *Pist.* (both in the disk and radius) Germen small, style thread-shaped; stigma cloven. *Peric.* none, except the unchanged calyx. *Seed* (in both kinds of florets) angular, smooth; down, of two kinds of capillary scales; the two innermost of the radius generally fetaccous and longest; the outermost capillary, united at the base into several parcels. *Recept.* composed of lanceolate, membranaceous scales.

Eff. Ch. *Receptacle* chaffy. *Seed-down* of two kinds, chaffy. *Corolla* radiated. *Calyx* scarious.

1. *R. glandulosa*. Thunb. and Willd.—Native of the interior of the Cape of Good Hope. For all that is known of this solitary species of *Rosenia*, we are indebted to the following description of Thunberg. "*Stem* shrubby, round, smooth, wavy, erect, much branched, generally more than two feet high. *Branches* and *branchlets* alternate, three or four together, in a cluster, spreading, striated: the branchlets lateral, very short, leafy. *Leaves* somewhat clustered, approximating, sessile, ovate, obtuse, undivided, slightly concave,

cave, chiefly glandular at the margin, downy, thickish, imbricated, half as long as the nail. *Flowers* capitate, terminal."

ROSENOU, in *Geography*, a town of Pomerania; eight miles S.S.E. of Cofslin.

ROSENTHAL, a town of the principality of Hesse; eight miles N.N.W. of Marburg.—Also, a town of Westphalia, in the bishopric of Hildesheim; three miles S.W. of Peina.—Also, a town of Prussia, in the palatinate of Culm; eight miles N.E. of Bretchen.—Also, a town of Bohemia, in the circle of Beclin; three miles N. of Rosenber.

ROSEOLA, in *Medicine*, a term appropriated, in the nomenclature of cutaneous diseases devised by the late Dr. Willan, to a rose-coloured rash or efflorescence upon the skin, which is variously figured, without any elevation of the surface, and not communicable by contagion.

This rash is of little importance in a practical view, because it is mostly a mere concomitant of different febrile complaints, and requires no deviation from the treatment adapted to their relief; but as it is sometimes mistaken both for scarlet fever and measles, which are contagious and often dangerous diseases, so it ought to be known, and its varieties discriminated. The appellation of roseola is to be found in the works of some of the early modern writers; but it was applied somewhat indiscriminately to every red rash, to scarlet fever, measles, &c. Fuller, in his *Exanthematologia*, p. 128, speaks of a sort of rose-rash, as a flushing all over the body, like fine crimson, which, he says, is void of danger, and "rather a ludicrous spectacle, than an ill symptom."

Seven varieties of roseola were distinguished by Dr. Willan under the following appellations.

1. The roseola *æstiva*, so called from its usual occurrence in summer, is sometimes preceded for a few days by slight febrile symptoms, such as pains in the head and limbs, lassitude, and listlessness. The rash appears first on the face and neck, and, in the course of a day or two, is distributed over the rest of the body, producing a considerable degree of itching and tingling. The mode of distribution is into separate small patches of various figure, but of larger and more irregular forms than in the measles, with numerous interstices of the natural skin. It is at first red, but soon assumes the deep roseate hue peculiar to it. The fauces are tinged with the same colour, and a slight roughness of the tonsils is felt in swallowing. The rash continues vivid through the second day; after which it declines in brightness, slight specks only of a dark red hue remaining on the fourth day, which, together with the constitutional affection, wholly disappear on the fifth.

Not unfrequently, however, the rash is partial, extending only over portions of the face, neck, and upper part of the breast and shoulders, in patches, very slightly elevated, and itching considerably. In this form the complaint continues a week or longer, the rash appearing and disappearing several times; sometimes without any apparent cause, and sometimes from sudden mental emotions, or from taking wine, spices, or warm liquors. The retrocession of the rash is usually accompanied with disorder of the stomach, head-ache, and faintness, which are immediately relieved on its re-appearance.

This species of roseola usually occurs in the summer season, and particularly in females of an irritable constitution. The patients commonly ascribe it to sudden alternations of heat and cold, and especially to having drunk cold liquors, when perspiring after exercise. Sometimes it occurs in connection with bilious diarrhœa, cholera, dys-

entery, or other bowel complaints of the hot season; and sometimes it appears after much fatigue.

Very little medical treatment is required for this eruption, which is generally alleviated by moderate diet, from which every thing heating is excluded; and by the use of acidulated drinks, with occasional laxative medicines. The complaint is never dangerous, except from the sudden repulsion of the eruption, in consequence of exposure to very chill air, or of the application of cold water; in which case violent disorder has taken place in the head, stomach, or bowels of the patient, as happens under similar circumstances in other eruptive diseases, such as measles, the red gum, &c.

2. The roseola *autumnalis* is not uncommon in children of five, or from that to ten years of age, in the autumn. It occurs in distinct patches, of an oval or circular shape, which occasion no elevation of the cuticle, and gradually increase to about the size of a shilling. Their hue is of a dark damask red; so that at a distance the skin appears as if stained with the juice of black cherries or mulberries. They are usually diffused over the arms, seldom on the face and body; and they continue about a week, being sometimes, but not always, succeeded by desquamation. This eruption is not accompanied by much itching or tingling, nor is there any symptom of general disorder, except a whiteness of the tongue. It is generally removed in a short time by the exhibition of the diluted sulphuric acid internally.

3. The roseola *annulata* appears on almost every part of the surface of the body in rose-coloured rings, which have central areas of the usual colour of the skin; and it likewise slightly affects the throat. The rings are at first from a line to two lines in diameter; but they gradually dilate, leaving a larger central space, sometimes to the diameter of half an inch; and excite, especially in the night, a troublesome sensation of heat, and of itching or prickling. The duration of the eruption is very uncertain; in some cases it commences with shivering succeeded by heat, and is attended with head-ache, flushing of the face, sickness at the stomach, and pains in the limbs; it then continues four or five days, and disappears as the febrile symptoms decline. In other cases, which are without fever, the complaint is of long duration; the efflorescence usually fades in the morning, and returns in the evening or night, the rings becoming vivid, and sometimes a little elevated. If the rings should disappear, or be very faint in colour for several successive days, the patient becomes affected with pain in the stomach, sickness, vomiting of bile, great languor, giddiness and aching in the limbs. These symptoms are alleviated or removed by the use of the warm bath, after which the efflorescence generally returns. Sea-bathing and the mineral acids afford much relief to the more chronic forms of this species of roseola.

The annular roseola appears to be sometimes connected with an irregular state of the catamenia in women, and with gouty and rheumatic complaints in both sexes. It sometimes succeeds to a fit of the gout, and we have seen it appear as the precursor of a fit, which immediately followed its disappearance.

4. The roseola *infantilis* affects children during the period of teething, in fevers, and in disorders of the bowels, and the rash is usually so close and full as to leave very small interstices of the natural hue of the skin. It is very irregular, however, in its appearance and progress, sometimes continuing only for a night; sometimes appearing and disappearing for several successive days, being attended with symptoms of violent irritation; and sometimes arising in
single,

single, but numerous and coalescing, patches, of about the size of a sixpence, which continue for several days, and terminate in scurf. This rash, where it is pretty generally diffused, is often mistaken, as Dr. Underwood has remarked, for measles and scarlet fever. Whence it is necessary, that its character should be well known to medical practitioners; although it requires no specific treatment, but usually disappears under the employment of remedies calculated to relieve the bowel complaints, painful dentition, and other febrile affections, with which it is so frequently connected.

5. The roseola *variolosa* occurs previous to the eruption of the small-pox, when produced by an inoculation, in the proportion of about one case in fifteen, according to observations made at the Small-Pox Hospital. It usually appears on the second day of the eruptive fever, which is generally the ninth or tenth after inoculation, and is deemed by inoculators a certain prognostic of a small and favourable eruption of the small-pox. It does also occasionally occur in the natural small-pox, on the third or fourth day, and with a moderate and favourable eruption of pustules; but it is much more rare than in the inoculated disease.

This rash is first observable on the arms, breast, and face: on the following day it extends over the trunk of the body and the extremities. Its distribution is various; sometimes in contiguous semicircles; sometimes in longitudinal irregular patches, with small distinct dots intermixed; and in a few cases, all these appearances being combined, it forms an almost continuous redness over the body, and is in several parts slightly elevated above the surface, as in the measles. It is not easily repelled by cold air, or cold drinks, as the early inoculators apprehended; and is aggravated by the confinement and sudorific medicines which they recommended.

These roseolous efflorescences, antecedent to the eruption of small-pox, were occasionally observed by the first writers on the disease; and both by them and subsequent authors were deemed to be measles, which were said to be converted into small-pox.

6. Roseola *vaccina*. An efflorescence which is somewhat diffuse, like the variolous rash, but appears generally in congeries of dots and small patches, a little elevated, takes place in some children on the ninth and tenth day of vaccination, at the place of inoculation, and at the same time with the areola that is formed round the vesicle; and from thence it spreads irregularly over the whole surface of the body. But this does not occur nearly so often as after variolous inoculation. It does not continue vivid above forty-eight hours; and is usually attended with a very quick pulse, a white tongue, and great restlessness. Some vaccinators attach little importance to it; others think it a favourable circumstance, as denoting that the skin and constitution have been fully affected by the cow-pock.

7. Roseola *miliaris*. This rash often accompanies an eruption of miliarial vesicles, with fever, where much heat and sweating have been excited. (See *MILIARY Fever*.) It occurs occasionally, however, in the continued fevers of this country, where neither a miliarial eruption nor profuse sweating had preceded it, and does not appear to be an unfavourable symptom. See Willan on Cutaneous Diseases, p. 433, et seq., and Bateman's Pract. Synopsis of Cutan. Dif. p. 96. 3d edit. See also Underwood, on the Dif. of Children, vol. i. p. 87.

ROSES, *Islands of Two*, in *Geography*, two small islands in the Indian sea, near the coast of Africa. S. lat. 17°.

ROSES. See ROSAS.

ROSETO, a river of Naples, which runs into the gulf of Tarento, N. lat. 40° 2'. E. long. 16° 40'.

ROSETTA, ROSSETTA, or *Rafchid*, a town of Egypt, of considerable size and population, founded in the eighth century, as some have said; though Elmacin informs us, that it was built during the reign of Elmetouakkel, caliph of Bagdad, towards the year 870 of our era, and under the pontificate of Cosma, patriarch of the Jacobites at Alexandria. Others date its foundation at a much later period; and Belon, who travelled in Egypt in 1530, says that this town was much smaller than Faoué, but at present it is much larger. It has borne the Arabic name Rafchid ever since the time of Edrissi the geographer, in 1153, and of this the Europeans have made Rosetta or Rossetta. Some have erroneously asserted, that it was built on the spot where Canopus was situated; whereas the Canopic branch of the Nile is the lagoon of Maadié, and the ruins of Canopus are at Aboukir. Rosetta affords no trace of antiquity; nevertheless it is certain, says Sonnini, that it cannot be far from the place where stood Metelis or Metilis, of which Strabo and Ptolemy make mention, and which was on the western bank, and near the mouth of the Bolbitic branch of the Nile. The heaps of sand, which this river is continually accumulating, no longer permit vessels to reach as far as Faoué. Although Rosetta was built at the mouth of the river, it is already two leagues from it. According to Abulfeda it was very inconsiderable in the 13th century; nor was it much increased for 200 years after this time. But when the Ottomans added Egypt to their conquests, they neglected the support of the canals. Thus, the canal of Faoué ceasing to be navigable, Rosetta became the emporium of the merchandise of Alexandria and Cairo. Commerce soon made it flourish, and it is at this day one of the handsomest towns in Egypt. It extends along the western bank of the Nile, and is above a league in length, by a quarter of a mile in breadth. Although it has no remarkable place, nor any one street quite regular, yet all the houses, being built with terraces, and well disposed, have, by Savary's description of it, an air of cleanliness and elegance, which is very agreeable; to which Sonnini adds, that here are seen long streets formed by two rows of shops, in which are found all sorts of goods; the necessaries of life being very plentiful, and procured at a low price. Within the houses are spacious apartments, well ventilated by a great number of windows, which are always open. The blinds and transparent linen, which they stretch over them, keep out the rays of the sun, afford a moderate light, and mitigate the excessive heats. The only public buildings worthy of notice are the mosques, with their lofty minarets, of light architecture, and constructed with much boldness. They thus produce a very picturesque effect in a town where all the roofs are flat, and throw great variety into the picture. The houses in general have a view of the Nile, and of the Delta, which form a most magnificent spectacle. The river is always covered with vessels, mounting and descending with oars, or under sail. The tumult of the harbour, the joy of the mariners, their noisy music, exhibit a moving and animated scene. The Delta, that immense garden, where the earth is never weary of production, furnishes the whole year a succession of harvests, of vegetables, of flowers, and of fruits; various species of cucumbers and delicious melons, the fig, the orange, the banana, the pomegranate, of the most exquisite flavour. To the north of the town are gardens, where lemon and orange trees, date trees, and sycamore trees, are planted at random; by their foliage affording an arch impenetrable to the rays

ROSETTA.

of the sun, and by their flowers rendering the shade of these groves delightful. The houses of Rosetta, says Sonnini, are much better built, in general, than those of Cairo: its situation upon the banks of the river; the view of the Delta, which presents, as Savary describes it, the delightful prospect of the most beautiful culture, the perfumed groves in its neighbourhood, and its pure and wholesome air, have most deservedly procured for it the name of the "garden of Egypt." Commerce constitutes the principal wealth of the inhabitants of Rosetta. The importation of foreign merchandize to Cairo, and of the productions of Egypt into the port of Alexandria, employs a great number of mariners. (See BOGHASS and SCHERM.) The bar of the Nile is totally shut during two months of the year, and the commerce of Alexandria is interrupted. But if all the ships in Egypt were to perish, the Ottoman government, says Savary, would not remove one inch of ground of the canal of Faoué to render it navigable. It suffers every thing to go to ruin, and repairs nothing.

In the town of Rosetta a profound silence reigns, uninterrupted by the noise of any carriage. The inhabitants move with gravity through the streets, clad in long robes which hang down to their heels. Their heads are covered with heavy turbans, or bound round with a schale or shawl, which is a long piece of stuff made of silk or wool. The girdle is made use of by both sexes. The citizen is armed with a knife, the soldier with a sabre, and a pair of pistols. The women of the lower class, whose dress consists of a large blue shift, and a long pair of drawers, have their faces covered with a piece of linen, with holes opposite to the eyes. The rich wear a large white veil, with a cloak of black silk, that wraps up their whole body. But though they are thus masked, they are not scrupulous in making signs, nor in ogling.

The most ordinary pastime here is smoking and drinking coffee. From morning to night the inhabitants have their pipes in their mouths; at home, in each other's houses, in the streets, on horseback, they keep their pipe lighted, and the tobacco-bag is hung at their waist. If the inhabitants of Rosetta be less barbarous, says Sonnini, than those of the other parts of Egypt, they are not less ignorant, less superstitious, nor less intolerant. We find among them, although with shades more softened down, the same roughness of character, the same implacable aversion towards the nations of Europe, and disposition to insult both Christians and Jews, the same revengeful disposition, in a word, the same treachery; and they are addicted to the same shameful vices, some of which we cannot name.

The country round Rosetta is an immense surface, without a mountain or hill, intersected by innumerable canals, covered with harvest and a variety of trees, which winter never strips of their leaves. The soil is a black mould, the fertility of which is inexhaustible. The chief article of cultivation is rice, called in the vicinity of Rosetta "sultani," which is sown from the month of March to that of May, transplanted on the banks of the Nile, and on the borders of the canals at the end of July, and cut in November. (See EGYPT.) Rice forms a principal article of exportation, which they dry by spreading upon the terraces of the houses and in the public squares; and to this operation is attributed the multitude of gnats, with which the town and the inside of the houses are filled at the time when it is performed.

Rosetta, besides being the great emporium of the trade that is carried on between Cairo and Alexandria, has some branches of commerce peculiar to itself; such as spun-

cotton, dyed red, which is drawn from the adjacent districts; dressed flax, linen cloths, silk dyes for the eastern dresses, &c. The flax of the country, which is long, soft, and silky, would make beautiful linen, if they knew how to employ it; but the spinsters are very inexpert, and the thread they make is clumsy, hard, and uneven. The linens they bleach serve for the table; the rest, dyed blue, is employed for the clothing of the people. In Rosetta there are store-houses of natron, and manufactories where it is used. (See NATRON.) Most of the merchants of this town are Turks or Syrians, and some from Barbary. The Copts are numerous, together with some Arabs. The command of the town is vested in an officer of the Mamlouks, who bears the title of Aga. About a league from the sea, northward of Rosetta, are two castles, one on the western bank of the Nile, and the other on the opposite bank of the river, constructed to defend the entrance of the river. The former, which is ascribed to St. Lewis in the time of the crusades, is almost entirely demolished; and the few cannon which remain in it are unfit for service. These two forts, though inconsiderable, and in a ruinous state, would be sufficient to stop vessels from entering the river, if the Turks knew how to make use of cannon; but here they have no occasion for it; as nature has guarded the mouth of the Nile, by raising a dangerous bar, called the *Boghass* or *Bogass*, which is the terror of mariners. About half a league to the south of Rosetta is a tower, called the tower of Canopus, from the erroneous supposition that Rosetta is on the site of the ancient Canopus. This tower has been built, in modern times, upon a hillock of sand, which at this place forms the W. bank of the Nile. It is square, and partly demolished. In the lower part the inhabitants of this district shew the opening of a subterraneous passage, which, as they say, led to Alexandria. Near the top of the same is presented a general view of the country, having no bounds except those which nature has prescribed; and near its foot, close to the edge of the Nile, stands a mosque, consecrated to a holy Mussulman, called "Abou-Mandour," which signifies father of the light. This saint, if he be the father of the light, is also the terror of the sands, as, but for him, they would long ago have overwhelmed Rosetta, and added it to their dreary domain. Opposite to this mosque, upon the E. bank of the Nile, are two or three houses, called Maadée, because they stand at the place facing the usual passage to the Delta. On the west bank, at a short distance above Abou-Mandour, is Dgeddié, a considerable village, in the environs of which a great number of vine-plants grow in the sand; from hence Rosetta and Alexandria are supplied with grapes.

At the foot of the tower above-mentioned, a large semicircular basin announces a port, which has been choked up by the sand. In digging at the bottom of this hillock, twenty beautiful marble pillars were discovered by a Turkish merchant, who was stripped of his fortune by the Beys, from an imagination that he had carried off a treasure from this place. M. d'Anville suspects that the ancient Bolbitina must have been at a very small distance from the spot on which Rosetta now stands. The ruins now mentioned seem to confirm his conjecture; as they are at the extremity of a town, and can only belong to the Bolbitina spoken of by Steph. Byz. and which gives its name to one of the branches of the Nile. This place is very picturesque; the tower, falling into ruins, is surrounded by tombs, and to the westward is a desert plain, whose burning extent the eye cannot look over without horror; but on the E. the contrast is very striking, presenting a majestic river, and the Delta,

uniting most profusely the graces of the spring, the beauty of the summer, and the rich luxuriance of the autumn.

Sir R. Wilson has given us a picture of Rosetta, very different from that which we have above exhibited. He says, it is built of a dingy red brick, and that a great part of the town is in ruins, many of the houses having been pulled down by the French for fuel. The streets are not more than two yards wide, and full of wretches, which the pride of civilization revolts at acknowledging to be human. The number of blind persons is prodigious; nearly every fifth inhabitant having either lost, or having some humour in, his eye. The erysipelas, the dropsy, the leprosy, the elephantiasis, and lusi naturæ, constantly offend the sight. Filth, mosquitos of the most dreadful sort, vermin of every kind, women foully that, fortunately for Europeans, their faces are concealed by a black cloth veil, in which are cut two eye-holes; stench intolerable; houses almost uninhabitable:—these form the charms of Rosetta, and Savary's garden of Eden. The quay, however, is allowed to be a handsome object, and might be made noble. The baths are represented as horridly disgusting. Dr. Wittman, cited also by Crutwell, observes, that though it contains but few striking public edifices, Rosetta must be considered as a handsome place by those who have been accustomed to mud walls and sandy deserts; the mosques and their minarets, as well as their houses, built with bricks, plastered over and white-washed. The population he estimates at 8 or 10,000, but from the number of empty houses, it appeared capable of containing at least treble that number. In 1807, the British were defeated here, with considerable loss, by the Turks; 90 miles N.W. of Cairo. N. lat. 31° 24'. E. long. 30° 40'. Savary. Sonnini. Niebuhr.

ROSETTE, in *Military Language*, an ornamental branch of ribbands, or cut leather, which is worn both by officers and soldiers in the British service, on the upper part of their cues.

ROSETTES, two small bunches of ribbands that are attached to the loops by which the gorget of an officer is suspended upon his chest. The colour of the ribband must correspond with the facing of the uniform. The French use the same term.

ROSETTI, DONATO, in *Biography*, an ingenious Italian, who flourished in the 17th century, but of whose personal history little is known. He was a native of Leghorn, where he was probably educated, and was so successful in the cultivation of the sciences, that at a very early age he was considered as completely qualified to teach mathematics and the elements of philosophy in different universities. While he was professor of logic at Pisa, he published a treatise relating to the system of the earth, which was well received. The title of this work was "Antignome fisico Mathematiche con il nuovo Orbe e Systema terrestre." This was followed by "A Collection of physico-mathematical Instructions;" "A Treatise on the Composition of Dutch Glasses, and Glass Drops;" "A Collection of physico-mathematical Demonstrations" of propositions which he had undertaken to prove. In his "Antignome," he maintained that the number of senses was eleven; this increase he made out by considering the different modes in which we touch bodies as so many different senses, and endeavouring to shew that the perceptions arising from them cannot properly be ascribed to the sense of feeling in general. He was the author of another treatise, entitled "Polista fedele," intended to explain the inclination of bodies to unite at their poles, and various phenomena respecting their hardness, their elasticity, their extension, and the causes which convert solids

into fluids. It is not known when this philosopher died: he was living at Pisa in the year 1678.

ROSETTI, ANTONIO, chapel-master to the duke of Mecklenburg Schwerin, born, according to Gerber, at Milan, in 1744; but we have better authority to say that he was a native of Bohemia, and a disciple of the great Haydn at Vienna, where, in 1755, he was a violinist in the imperial chapel, and afterwards in the service of count Althan, 1780. Since that time he has been a voluminous publisher at Hamburgh and Leipzig, of pieces for the piano-forte, with and without a violin accompaniment, of symphonies for a full orchestra, on the plan of his master Haydn, flute concertos, &c. Some of his symphonies, when performed at the concerts in England, while Haydn was in this country, we thought written with force, and abounding with fire and new passages.

ROSEWAY PORT, in *Geography*, a populous sea-port town on the S.E. coast of Nova Scotia, N.E. by E. of cape Negro and Harbour.

ROSEWAY Island, an island that lies at the mouth of Port Wager, on the S.E. coast of Nova Scotia.

ROSEWELL, THOMAS, in *Biography*, a Presbyterian divine, was born in Somersetshire about the year 1630, and was educated at Oxford. After leaving the university, he was presented to the living of Strode, in his native county, from which he was ejected in the year 1662, by the Bartholomew act. In 1674 he officiated with a Non-conformist congregation at Rotherhithe; and in the year 1684 he was arrested on a charge of high treason: on this charge he was tried in the court of king's bench, November 8th, before the infamous Jefferies. The indictment was on words said to have been delivered from the pulpit, and the witnesses were three women of abandoned characters, of whom the chief was afterwards set in the pillory for perjury. The trial lasted seven hours, and Mr. Rosewell behaved with all the decency and respect that could have been expected, and made a defence that was applauded by all who heard him. The women, says bishop Burnet, could not prove, by any circumstance, that they were even present at the meeting, and the words to which they swore were so gross, that it was not to be imagined that any man in his wits would have made use of them in a mixed assembly; yet Jefferies urged the matter with his usual vehemence. He laid it down as an axiom, concerning which there could be no controversy, that all preaching at conventicles, as he was pleased to call dissenting places of worship, was treasonable, and that this ought to dispose the jury to believe any evidence upon that head. The jury accordingly found the prisoner guilty. As soon, however, as the trial was over, sir John Talbot, who was present at it, went to the king, and urged it on his majesty, that if such evidence was admitted, as had appeared against Mr. Rosewell, no one of his subjects would be safe. Upon this, when Jefferies soon after came into the royal presence, with an air of exultation and triumph, to congratulate his majesty on the conviction of a traitor, the king afforded him a cool reception, which mortified him exceedingly, but at the same time it gave a complete turn to the bent of his mind; so that when the court met to hear Mr. Rosewell's counsel, who moved for an arrest of judgment, this judge, who was as mean as he was corrupt and cruel, assumed a tone of moderation, and strongly recommended to the king's counsel caution and deliberation where the life of a man was depending. The prisoner was, in the end, pardoned. He died in 1691. Neal's Hist. vol. iv.

ROSHAN, or ROSHAWN, in *Geography*, a country of Asia, situated between Meckley and Arracan, between

92° and 95° E. long., and 21° and 23° N. lat.; about 120 miles in length, and 80 in breadth. See ARRACAN.

ROSHEIM, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the district of Barr; 15 miles S.W. of Straßburgh. The place contains 3355, and the canton 12,017 inhabitants, on a territory of 227½ kilometres, in 15 communes.

ROSHOVER, a township of Pennsylvania, in West-minster county, containing 1786 inhabitants.

ROSICRUCIANS. See ROSYCRUCIANS.

ROSIENNE, in *Geography*, a town of Samogitia, in which the diet and court of judicature are held; 76 miles S. of Mittaw. N. lat. 55° 30'. E. long. 41° 57'.

ROSIERE, LA, a small island near the S.W. coast of the island of Jersey; 1 mile E.S.E. of Noirmont Point.

ROSIERE, a town of France, in the department of the Somme, and chief place of a canton, in the district of Montdidier. The place contains 2760, and the canton 13,812 inhabitants, on a territory of 120 kilometres, in 21 communes.

ROSIERES *aux Salines*, a town of France, in the department of the Meurte, on the Meurte, formerly celebrated for its salt-works; 6 miles W. of Lunéville.

ROSIERS, a town of France, in the department of the Mayne and Loire, on the Loire; 7 miles N.W. of Saumur.

ROSIERS, *Cape*, the S. limit of the mouth of the river St. Lawrence; being the easternmost point of the district of Gaspee, in Lower Canada. N. lat. 48° 56'. W. long. 63° 40'.

ROSIGNANA, a town of Etruria; 13 miles S.E. of Pisa.

ROSIL, in *Rural Economy*, a term applied to such land as is neither light nor heavy, being a medium between sand and clay; it is sometimes written *rosills*.

ROSILLY BAY, in *Geography*, a bay on the S. coast of Wales. N. lat. 51° 32'. W. long. 4° 16'.

ROSIN, JOHN, in *Biography*, an antiquary, was born at Eifnach in 1551, and died of the plague in 1626. He was author of "Antiquitatum Romanarum," a work of high reputation, of which the best edition is that of Utrecht, in 1701.

ROSIN, *Resina*, in *Pharmacy*. See RESIN.

ROSIN is particularly used for a resinous matter prepared from the juice of the pine-tree; in ordinary use for the making of ointments, plasters, and for other purposes.

For the method of procuring it, see PINE, and TURPENTINE.

ROSITO, in *Geography*, a town of Naples, in Calabria Citra; 16 miles N.E. of Cassano.

ROSITO, *Cape*, a cape on the east coast of Calabria. N. lat. 40° 5'. E. long. 16° 40'.

ROSKOPF, a mountain of Austrian Swabia; 1 mile S.E. of Schonau.

ROSLAND, in our *Old Writers*, heathy land, or ground full of ling; also watery and moorish land.

ROSLAVL, in *Geography*, a town of Russia, in the government of Smolenk. N. lat. 54°. E. long. 32° 50'.

ROSLAW, a river of Saxony, which runs into the Elbe, opposite to Dessau.

ROSLDORF, a town of Austria; 6 miles S.W. of Ehrnsprunn.

ROSLYN, ROSLIN, *Roselyn*, or *Roskelyn*, a village in the parish of Lafwade, and county of Midlothian, Scotland, is about six miles S.S.W. from Edinburgh. This place is much celebrated on account of its castle and chapel, and for the romantic character of the scenery in its immediate vicinity. An excursion to Roslyn is one of the fa-

avourite summer recreations of the inhabitants of the northern metropolis; and no traveller of taste leaves that part of the kingdom, without contemplating its beauties. The castle is seated on a bold and lofty rock, overhanging the river North-Esk, which dashes over a rugged channel at the base, in a semicircular sweep; and the precipitous banks are covered with a profusion of wood. Only a very small portion of the ancient building is now standing; but a modern mansion has been erected on part of the old walls. It is uncertain when this castle was built; but that event most probably occurred about the commencement of the 12th century, when William de Sancto-Clere (son to Waldernus de St. Clere, who came to England with William the Conqueror) obtained a grant of the barony of Roslyn from the Scottish king, Malcolm Canmore. No mention of it is made in history, however, till the reign of James II. of Scotland, when Sir William Hamilton is stated to have been confined here, for joining the rebellious standard of Earl Douglas. In 1554 it was set fire to, and in great part demolished, by the forces of King Henry VIII. The St. Clere family, or, as the name is now spelt, St. Clair, was anciently of great note in Scotland. Their possessions were very extensive, and their titles numerous, being Earls of Caithness and Orkney, Lords of Nithsdale, and Barons of Pentland, Couf-lande, Cardain, Saint-Clair, Herbertshire, Hertford, Grahamshaw, Kirkton, Cavers, Newborough, and Roxburgh. Their affluence and power exceeded that of most contemporary nobles, either in England or Scotland; and they lived in a style of magnificence and splendour, which even the Scottish monarchs were scarcely able to rival. James II. conferred upon them the honour of being hereditary patrons and grand masters of masonry in Scotland; privileges which they continued to enjoy for several generations.

The chapel of Roslyn occupies the summit of a hill above the castle. It was founded in the year 1446, by William Saint Clair, Earl of Caithness and Orkney, for a provost, six prebendaries, and two singing boys; and was endowed by him with considerable landed possessions. He did not, however, live to complete his undertaking, notwithstanding he spared neither trouble nor expence to effect this purpose before his death, which happened in 1479. From a manuscript memoir of the house of Douglas, deposited in the library of the Faculty of Advocates at Edinburgh, we learn many curious particulars relative to the building of this chapel. It is there said, that the founder "caused artificers to be brought from other regions and forraigne kingdoms, and caused dayly to be abundance of all kinde of workemen present;" and it is subsequently added, "and to the end the worke might be more rare, he caused the draughts to be drawn upon Eastland boards, and made the carpenters to carve them according to the draughts, and then gave them for patterns to the masons, that they might thereby cut the like in stone." The present building is generally supposed to have been intended only for the choir of a large collegiate church, which, according to tradition and probability, it was the design of the founder to have erected. Though in a mutilated state, its architecture is unique, and combines, according to Mr. Gandy, "the Egyptian, Grecian, Roman, and Saracenic styles;" and exhibits the arch "in all its possible forms and principles." This structure measures in the interior 68 feet in length, and 35 in breadth. The exterior is supported by 21 buttresses, surmounted by pinnacles, each differing from the others in its ornaments. Two of these buttresses have double pinnacles, the outer shafts of which are smaller than the inner, with which they are connected by flying abutments. Similar

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members also unite the larger pinnacles with the upper part of the chapel. The eastern end displays five buttresses, with four pointed windows intervening, all of uniform size and style, though varying somewhat in the tracery work with which they are ornamented. Each window is divided by a stone mullion, faced, both internally and externally, with double columns; and the transeom of the arch is decorated with half figures of persons in the attitude of supplication, and with different kinds of foliage. On the north and south sides of the chapel, in the lower compartment, are five windows of a similar kind; also a pointed arched door-way, recessed under a larger semicircular arch, above which is an irregular triangular window, highly ornamented. Another tier of windows, on each side, gives light to the upper part of the building; but these are now much mutilated, having lost their mullions, tracery, &c. Between every two windows are two canopied niches, and a bracket, which appear to have been designed for statues. This portion of the building is supported by two opposite ranges of five arches each, separating the body of the chapel from the side aisles; beyond which, at the east end, there are two columns, and two more in the centre between them, all of them supporting stone beams, exhibiting a great variety of sculptural ornaments. One of the centre pillars is wreathed, and is popularly called the apprentice's pillar, from a tradition respecting its execution by an apprentice of the master mason of the structure; who, it is said, finding himself unable to understand the model furnished to him, went abroad for instructions, during which time the work was accomplished by the apprentice. It is singular that a similar story is told of some of the best sculptures in Melrose abbey; and we believe, also, of a much later production of art, the statue of king Charles II. in the Parliament-square at Edinburgh. Two heads in the chapel are said to represent the master and the apprentice. The former is shewn as frowning, and the latter with a fear or indention on the forehead, to denote that he was murdered by his master, through envy of his superior genius. At the east end of the chapel are four altars, dedicated to different saints. "Of arches," says Mr. Britton, in his *Architectural Antiquities*, "there are more than thirteen varieties to be found in this building. A flat or segment beneath the roof of the aisles, and over the door to the sub-chapel; semicircular in the vault of the roof, and over the entrance doors; groined, acutely pointed over the western aisle; flat pointed between the centre and side aisles; sharp pointed in the lower windows; ogee to the piscinas; flattened, and latest of the pointed style, inside of the door-way, south side; half segment in the flying buttresses; counter arch in the triangular windows; flat arch and segment joined in a door in the vault; several arches of various forms in the windows, niches, and canopies, also in the battlements." The vault above-mentioned is the burying-place of the family of the Sinclairs. The soil of it is so dry, that bodies have been found entire 80 years after their interment. They were formerly buried in armour, and without a coffin. "The late Roslin," says father Hay, in his MS. memoirs, "was the first that was buried in a coffin, contrary to the sentiments of James VII., who was then in Scotland;" and he adds, "that the great expence my mother was at in burying her husband, occasioned the sumptuary acts that were made in the next parliament." There was formerly a superstitious story relative to this chapel current among the common people in the neighbourhood. They believed that, previous to the death of any member of the Saint Clair family, the chapel was to be seen in flames, without sustaining any injury. This superstition is alluded to by Mr.

Scott, in his "Lay of the Minstrel," in the following beautiful lines:

"Seem'd all on fire that chapel proud,
Where Roslin's chiefs uncoffin'd lie,
Each baron, for his sable shroud,
Sheath'd in his iron panoply.
Seem'd all on fire, within, around,
Deep sacrifty, and altar's pale;
Shone every pillar foliage bound,
And glimmer'd all the dead men's mail.
Blaz'd battlement and pinnet high,
Blaz'd every rose-carv'd buttress fair,
So still the blaze, when fate is nigh,
'The lordly line of high St. Clair.'"

The village of Roslyn was anciently a place of considerable importance. King James II. constituted it a burgh of barony in the year 1456, and granted to the inhabitants a weekly market and a fair; but these privileges are now abandoned. The fields immediately contiguous are celebrated in history as the scene of three sanguinary engagements betwixt the English and Scotch; all fought on the same day, the 24th of February, 1303. The particulars are thus narrated by the Scottish historians. During a truce, Ralph Confroy, treasurer to Edward I., invaded Scotland at the head of thirty thousand men. With a view to plunder, he divided his forces into three bodies; and having reached the vicinity of Roslyn, encamped them in three distant stations. On being apprised of this invasion, sir John Cumming and sir Simon Frazer marched with 10,000 men to watch the motions of the enemy; and finding the first division unprepared, attacked and routed it with great slaughter. The second division coming up immediately after the battle, shared the same fate; as did likewise the third division, which appeared in a similar manner at the close of the second action. This engagement excited much interest both at home and abroad; and is ranked among the noblest efforts of Scottish bravery. About half a mile lower down the Esk, is situated the house of Hawthornden, the celebrated poet and historian, but also for the caves under it. There are various conjectures as to the original intention of these subterraneous cavities. Stukeley has given credit to a fabulous tradition, that they were strong holds of the Pictish kings; and accordingly one cave is called the king's gallery, another the king's bed-chamber, and a third the guard-room. Setting aside this groundless tradition, the most probable opinion is, that they were resorted to as places of refuge during the destructive wars between the English and Scotch. Detached from the principal caves is a smaller one, called the Cypress grove, where Drummond is said to have composed many of his poems. It was in these caverns that the famous sir Alexander Ramsay, one of the ancestors of the Dalhousie family, who performed such exploits of valour in the contest for the crown between Bruce and Baliol, used to conceal himself. Here he was resorted to by the young warriors of his day, who considered it as a necessary part of military education to have been of his band. From thence he sallied forth, as occasion presented itself, and attacked the English, then in possession of Edinburgh. The *Statistical Account of Scotland*, by sir John Sinclair. *Architectural Antiquities of Great Britain*, vol. iii. 4to. by John Britton, F.S.A. *A Companion and useful Guide to the Beauties of Scotland and the Hebrides*, &c. by the Hon. Mrs. Murray Aust, of Kensington, 2 vols. 8vo. Lond. 1810.

ROSMARILHAL, a town of Portugal, in the province of Beira, on the borders of Spain; 8 miles W. of Alcantara, in Spain. N. lat. $39^{\circ}33'$. W. long. $6^{\circ}50'$.

ROSMARINUS, in *Botany*, so called from *ros*, dew, and *marinus*, alluding to its situation on the sea-shore. Those who have observed it mantling the rocks of the Mediterranean in winter, with its grey flowers glittering with dew, cannot but be struck with the elegant propriety of the name.—Linn. Gen. 16. Schreb. 22. Willd. Sp. Pl. v. 1. 126. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc. Sibth. v. 1. 12. Ait. Hort. Kew. v. 1. 52. Tournef. t. 92. Juss. 111. Lamarck Illustr. t. 19.—Class and order, *Diandria Monogynia*. Nat. Ord. *Verticillata*, Linn. *Labiata*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, compressed at the upper part, with an erect mouth; upper lip undivided; lower cloven. *Cor.* unequal; tube longer than the calyx; limb gaping; upper lip divided into two parts, erect, shorter, acute, with reflexed margins; lower reflexed, trifid; the middle segment very large, concave, narrow at the base; the lateral ones narrow, acute. *Stam.* Filaments two, awl-shaped, simple, with a tooth at one side, inclined towards the upper lip, and exceeding it in length; anthers simple. *Pist.* Germen superior, four-cleft; style resembling the stamens; stigma simple, acute. *Peric.* none, except the permanent calyx, which contains four ovate seeds in its bottom.

Obs. This genus approaches very near to *Salvia*, from which however it differs in having the stamens simply furnished with a lateral tooth.

Ess. Ch. Corolla unequal, its upper lip cloven. Filaments longer than the corolla, curved, simple with a tooth. Calyx campanulate, trifid. Seeds four, naked.

1. *R. officinalis*. Common Rosemary. Linn. Sp. Pl. 33. Sm. Fl. Græc. Sibth. t. 14. Woodv. Med. Bot. t. 87.—Leaves sessile.—Native of the south of Europe, the Levant, and occasionally in the Grecian islands; common in gardens, flowering from January to May.—An erect, evergreen shrub, four feet high, very much branched; branches obscurely quadrangular, downy, leafy on all sides. Leaves opposite, spreading in a recurved manner, linear-oblong, obtuse, revolute, entire; smooth, dark green, and shining above; downy and veined beneath. Flowering branches axillary, opposite, short, very leafy. Flowers axillary, terminal, on very short stalks, erect, of a bright blue colour, variegated with purple and white, having, like the leaves, a strong aromatic fragrance, resembling camphor. This is the *Ῥοσμῆριον* of Dioscorides and other ancient authors. Rosemary, when wild, has broader leaves, larger flowers, and a stronger scent than when cultivated in our gardens; indeed Miller, following the old writers, regarded this as a sufficient ground to make them distinct species; the former being subject to a variety whose leaves are striped with yellow, and hence called *Gold-striped Rosemary*; the latter varying with a white stripe, and thence named *Silver-striped Rosemary*. The silver variety is very tender. From an old opinion of Rosemary-juice having the property of strengthening the memory, this plant has been poetically made an emblem of remembrance or fidelity; and this was probably the origin of its being worn or used at funerals and weddings.

2. *R. chilensis*. Chili Rosemary. Willd. n. 2. Ait. Hort. Kew. v. 1. 52.—Leaves on stalks.—Native of Chili, and flowering in July. This shrub is only known from Molina's Natural History of Chili, who describes it as having stalked leaves. Future observation must determine whether or not it be really a *Rosmarinus*.

ROSMARINUS, in *Gardening*, contains plants of the hardy, shrubby, evergreen kind, of which the species cultivated is the officinal rosemary (*R. officinalis*).

There are varieties of this with narrow leaves; with broad leaves; with silver-striped leaves, and with gold-striped leaves.

Method of Culture.—In all the sorts it may be effected by planting slips or cuttings in the early spring months, as from March to May, as well as by layers; in performing the first methods of which a quantity of young shoots should be cut, or stripped off, from about five or six to eight or ten inches long, stripping off the lower leaves, and then planting them in a border of light earth, in rows a foot asunder, giving a good watering, and repeating it frequently till they are rooted, which they effect in a short time; in the same year they shoot at top, and become tolerable little plants by autumn; when about the beginning or middle of September, or in the spring following, they may be transplanted where they are designed to remain for growth.

The layers should be laid down in any of the convenient lower young branches, into the earth, in the spring, summer, or autumn, and they will be well rooted by autumn following, when they may be taken off, and planted out where they are to remain for plants.

Almost all the varieties are moderately hardy ever-green plants, though the common green sorts are the most so; the striped kinds being liable to suffer by hard frosts, if much exposed, or planted in wet ground; of course they, as well as all the sorts, should have a warm situation and dry soil: some of the variegated kinds should also be potted, in order to have the shelter of a green-house in winter. They are most durable in dry poor soils. In regard to the uses of these plants, the common green sorts are generally made use of for different medicinal purposes, the leaves as well as the flowers being employed, and both these and the striped kinds are planted out as shrubs for the sake of affording a more full variety. They all afford variety of colour in the borders, clumps, and other parts of gardens and shrubberies.

ROSMARINUS, in the *Materia Medica*. See ROSEMARY. ROSMARUS, in *Zoology*, the name of an animal called also by some the sea-horse, and more usually known by the name of *morfe*.

ROSMITHAL, in *Geography*, a town of Bohemia, in the circle of Prachatitz; 11 miles N. of Blatna.

ROSNAY, a town of France, in the department of the Indre; 8 miles N.E. of Le Blanc.

ROSNY, a town of France, in the department of the Seine and Oise; 3 miles W. of Mantes.—Also, a town of France; 5 miles E. of Paris.

ROSOLIS, or Ros-solis, popularly *Rosa-folis*, *fundew*, an agreeable spirituous liquor, formerly much in repute, chiefly taken after meals, by way of a drachm, to aid digestion; being composed of burnt brandy, sugar, cinnamon, and milk-water, and sometimes perfumed with a little musk.

It had its name, because anciently prepared wholly of the distilled water of the plant *Ros folis*, which see; but that plant was at length neglected in the composition.

The best was that of Turin. The French have now a particular kind, not called *ros folis*, but *du roy*; because used with good effect by Louis XIV. It is composed of Spanish wine, in which are infused anise, fennel, aneth, coriander, &c. for three weeks.

ROSOMACHA, or ROSOMAK, in *Zoology*, a name given by the Russians to the glutton. They are, says Olaus, taken by the hunters chiefly on account of their
skins,

members also unite the larger pinnacles with the upper part of the chapel. The eastern end displays five buttresses, with four pointed windows intervening, all of uniform size and style, though varying somewhat in the tracery work with which they are ornamented. Each window is divided by a stone mullion, faced, both internally and externally, with double columns; and the transeom of the arch is decorated with half figures of persons in the attitude of supplication, and with different kinds of foliage. On the north and south sides of the chapel, in the lower compartment, are five windows of a similar kind; also a pointed arched door-way, recessed under a larger semicircular arch, above which is an irregular triangular window, highly ornamented. Another tier of windows, on each side, gives light to the upper part of the building; but these are now much mutilated, having lost their mullions, tracery, &c. Between every two windows are two canopied niches, and a bracket, which appear to have been designed for statues. This portion of the building is supported by two opposite ranges of five arches each, separating the body of the chapel from the side aisles; beyond which, at the east end, there are two columns, and two more in the centre between them, all of them supporting stone beams, exhibiting a great variety of sculptural ornaments. One of the centre pillars is wreathed, and is popularly called the apprentice's pillar, from a tradition respecting its execution by an apprentice of the master mason of the structure; who, it is said, finding himself unable to understand the model furnished to him, went abroad for instructions, during which time the work was accomplished by the apprentice. It is singular that a similar story is told of some of the best sculptures in Melrose abbey; and we believe, also, of a much later production of art, the statue of king Charles II. in the Parliament-square at Edinburgh. Two heads in the chapel are said to represent the master and the apprentice. The former is shewn as frowning, and the latter with a fear or indention on the forehead, to denote that he was murdered by his master, through envy of his superior genius. At the east end of the chapel are four altars, dedicated to different saints. "Of arches," says Mr. Britton, in his *Architectural Antiquities*, "there are more than thirteen varieties to be found in this building. A flat or segment beneath the roof of the aisles, and over the door to the sub-chapel; semicircular in the vault of the roof, and over the entrance doors; groined, acutely pointed over the western aisle; flat pointed between the centre and side aisles; sharp pointed in the lower windows; ogee to the piscinas; flattened, and latest of the pointed style, inside of the door-way, south side; half segment in the flying buttresses; counter arch in the triangular windows; flat arch and segment joined in a door in the vault; several arches of various forms in the windows, niches, and canopies, also in the battlements." The vault above-mentioned is the burying-place of the family of the Sinclairs. The soil of it is so dry, that bodies have been found entire 80 years after their interment. They were formerly buried in armour, and without a coffin. "The late Roslin," says father Hay, in his MS. memoirs, "was the first that was buried in a coffin, contrary to the sentiments of James VII., who was then in Scotland;" and he adds, "that the great expence my mother was at in burying her husband, occasioned the sumptuary acts that were made in the next parliament." There was formerly a superstitious story relative to this chapel current among the common people in the neighbourhood. They believed that, previous to the death of any member of the Saint Clair family, the chapel was to be seen in flames, without sustaining any injury. This superstition is alluded to by Mr.

Scott, in his "Lay of the Minstrel," in the following beautiful lines:

"Seem'd all on fire that chapel proud,
Where Roslin's chiefs uncoffin'd lie,
Each baron, for his sable shroud,
Sheath'd in his iron panoply.
Seem'd all on fire, within, around,
Deep sacrifty, and altar's pale;
Shone every pillar foliage bound,
And glimmer'd all the dead men's mail.
Blaz'd battlement and pinnet high,
Blaz'd every rose-carv'd buttress fair,
So still the blaze, when fate is nigh,
The lordly line of high St. Clair."

The village of Roslyn was anciently a place of considerable importance. King James II. constituted it a burgh of barony in the year 1456, and granted to the inhabitants a weekly market and a fair; but these privileges are now abandoned. The fields immediately contiguous are celebrated in history as the scene of three sanguinary engagements betwixt the English and Scotch; all fought on the same day, the 24th of February, 1303. The particulars are thus narrated by the Scottish historians. During a truce, Ralph Confroy, treasurer to Edward I., invaded Scotland at the head of thirty thousand men. With a view to plunder, he divided his forces into three bodies; and having reached the vicinity of Roslyn, encamped them in three distant stations. On being apprised of this invasion, sir John Cumming and sir Simon Frazer marched with 10,000 men to watch the motions of the enemy; and finding the first division unprepared, attacked and routed it with great slaughter. The second division coming up immediately after the battle, shared the same fate; as did likewise the third division, which appeared in a similar manner at the close of the second action. This engagement excited much interest both at home and abroad; and is ranked among the noblest efforts of Scottish bravery. About half a mile lower down the Esk, is situated the house of Hawthornden, remarkable not only for its having belonged to Drummond, the celebrated poet and historian, but also for the caves under it. There are various conjectures as to the original intention of these subterraneous cavities. Stukeley has given credit to a fabulous tradition, that they were strong holds of the Pictish kings; and accordingly one cave is called the king's gallery, another the king's bed-chamber, and a third the guard-room. Setting aside this groundless tradition, the most probable opinion is, that they were resorted to as places of refuge during the destructive wars between the English and Scotch. Detached from the principal caves is a smaller one, called the Cypress grove, where Drummond is said to have composed many of his poems. It was in these caverns that the famous sir Alexander Ramsay, one of the ancestors of the Dalhousie family, who performed such exploits of valour in the contest for the crown between Bruce and Baliol, used to conceal himself. Here he was resorted to by the young warriors of his day, who considered it as a necessary part of military education to have been of his band. From thence he sallied forth, as occasion presented itself, and attacked the English, then in possession of Edinburgh. The *Statistical Account of Scotland*, by sir John Sinclair. *Architectural Antiquities of Great Britain*, vol. iii. 4to. by John Britton, F.S.A. *A Companion and useful Guide to the Beauties of Scotland and the Hebrides*, &c. by the Hon. Mrs. Murray Aust, of Kensington, 2 vols. 8vo. Lond. 1810.

ROSMARILHAL, a town of Portugal, in the province of Beira, on the borders of Spain; 8 miles W. of Alcantara, in Spain. N. lat. $39^{\circ}33'$. W. long. $6^{\circ}50'$.

ROSMARINUS, in *Botany*, so called from *ros*, dew, and *marinus*, alluding to its situation on the sea-shore. Those who have observed it mantling the rocks of the Mediterranean in winter, with its grey flowers glittering with dew, cannot but be struck with the elegant propriety of the name.—Linn. Gen. 16. Schreb. 22. Willd. Sp. Pl. v. 1. 126. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc. Sibth. v. 1. 12. Ait. Hort. Kew. v. 1. 52. Tournef. t. 92. Juss. 111. Lamarek Illustr. t. 19.—Class and order, *Diandria Monogynia*. Nat. Ord. *Verticillata*, Linn. *Labiata*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, compressed at the upper part, with an erect mouth; upper lip undivided; lower cloven. *Cor.* unequal; tube longer than the calyx; limb gaping; upper lip divided into two parts, erect, shorter, acute, with reflexed margins; lower reflexed, trifid; the middle segment very large, concave, narrow at the base; the lateral ones narrow, acute. *Stam.* Filaments two, awl-shaped, simple, with a tooth at one side, inclined towards the upper lip, and exceeding it in length; anthers simple. *Pist.* Germen superior, four-cleft; style resembling the stamens; stigma simple, acute. *Peric.* none, except the permanent calyx, which contains four ovate seeds in its bottom.

Obs. This genus approaches very near to *Salvia*, from which however it differs in having the stamens simply furnished with a lateral tooth.

Eff. Ch. Corolla unequal, its upper lip cloven. Filaments longer than the corolla, curved, simple with a tooth. Calyx campanulate, trifid. Seeds four, naked.

1. *R. officinalis*. Common Rosemary. Linn. Sp. Pl. 33. Sm. Fl. Græc. Sibth. t. 14. Woodv. Med. Bot. t. 87.—Leaves sessile.—Native of the south of Europe, the Levant, and occasionally in the Grecian islands; common in gardens, flowering from January to May.—An erect, evergreen shrub, four feet high, very much branched; branches obscurely quadrangular, downy, leafy on all sides. Leaves opposite, spreading in a recurved manner, linear-oblong, obtuse, revolute, entire; smooth, dark green, and shining above; downy and veined beneath. Flowering branches axillary, opposite, short, very leafy. Flowers axillary, terminal, on very short stalks, erect, of a bright blue colour, variegated with purple and white, having, like the leaves, a strong aromatic fragrance, resembling camphor. This is the *ΑΙΣΑΥΡΗ* of Dioscorides and other ancient authors. Rosemary, when wild, has broader leaves, larger flowers, and a stronger scent than when cultivated in our gardens; indeed Miller, following the old writers, regarded this as a sufficient ground to make them distinct species; the former being subject to a variety whose leaves are striped with yellow, and hence called *Gold-striped Rosemary*; the latter varying with a white stripe, and thence named *Silver-striped Rosemary*. The silver variety is very tender. From an old opinion of Rosemary-juice having the property of strengthening the memory, this plant has been poetically made an emblem of remembrance or fidelity; and this was probably the origin of its being worn or used at funerals and weddings.

2. *R. chilensis*. Chili Rosemary. Willd. n. 2. Ait. Hort. Kew. v. 1. 52.—Leaves on stalks.—Native of Chili, and flowering in July. This shrub is only known from Molina's Natural History of Chili, who describes it as having stalked leaves. Future observation must determine whether or not it be really a *Rosmarinus*.

ROSMARINUS, in *Gardening*, contains plants of the hardy, shrubby, evergreen kind, of which the species cultivated is the official rosemary (*R. officinalis*).

There are varieties of this with narrow leaves; with broad leaves; with silver-striped leaves, and with gold-striped leaves.

Method of Culture.—In all the sorts it may be effected by planting slips or cuttings in the early spring months, as from March to May, as well as by layers; in performing the first methods of which a quantity of young shoots should be cut, or stripped off, from about five or six to eight or ten inches long, stripping off the lower leaves, and then planting them in a border of light earth, in rows a foot asunder, giving a good watering, and repeating it frequently till they are rooted, which they effect in a short time; in the same year they shoot at top, and become tolerable little plants by autumn; when about the beginning or middle of September, or in the spring following, they may be transplanted where they are designed to remain for growth.

The layers should be laid down in any of the convenient lower young branches, into the earth, in the spring, summer, or autumn, and they will be well rooted by autumn following, when they may be taken off, and planted out where they are to remain for plants.

Almost all the varieties are moderately hardy ever-green plants, though the common green sorts are the most so; the striped kinds being liable to suffer by hard frosts, if much exposed, or planted in wet ground; of course they, as well as all the sorts, should have a warm situation and dry soil: some of the variegated kinds should also be potted, in order to have the shelter of a green-house in winter. They are most durable in dry poor soils. In regard to the uses of these plants, the common green sorts are generally made use of for different medicinal purposes, the leaves as well as the flowers being employed, and both these and the striped kinds are planted out as shrubs for the sake of affording a more full variety. They all afford variety of course in the borders, clumps, and other parts of gardens and shrubberies.

ROSMARINUS, in the *Materia Medica*. See **ROSEMARY**.

ROSMARUS, in *Zoology*, the name of an animal called also by some the sea-horse, and more usually known by the name of *morfe*.

ROSMITHAL, in *Geography*, a town of Bohemia, in the circle of Prachatitz; 11 miles N. of Blatna.

ROSNAY, a town of France, in the department of the Indre; 8 miles N.E. of Le Blanc.

ROSNY, a town of France, in the department of the Seine and Oise; 3 miles W. of Mantes.—Also, a town of France; 5 miles E. of Paris.

ROSOLIS, or **ROS-SOLIS**, popularly *Rosa-folis*, *fundew*, an agreeable spirituous liquor, formerly much in repute, chiefly taken after meals, by way of a drachm, to aid digestion; being composed of burnt brandy, sugar, cinnamon, and milk-water, and sometimes perfumed with a little musk.

It had its name, because anciently prepared wholly of the distilled water of the plant *Ros folis*, which see; but that plant was at length neglected in the composition.

The best was that of Turin. The French have now a particular kind, not called *ros folis*, but *du roy*; because used with good effect by Louis XIV. It is composed of Spanish wine, in which are infused anise, fennel, aneth, coriander, &c. for three weeks.

ROSOMACHA, or **ROSOMAK**, in *Zoology*, a name given by the Russians to the glutton. They are, says Olaus, taken by the hunters chiefly on account of their skins,

skins, which are much esteemed by people of fortune for robes, as being variegated with very bright colours, resembling flowers. See *URSUS Gulo*.

ROSOSZE, in *Geography*, a town of Austrian Lithuania; 30 miles S.W. of Brzesk.

ROSOY. See *ROZOY*.

ROSPORDEN, a town of France, in the department of the Finisterre, and chief place of a canton, in the district of Quimper. The place contains 560, and the canton 4413 inhabitants, on a territory of 127½ kilometres, in four communes.

ROSPUS, a name used by some authors for the strange fish called the *rana piscatrix*, or frog-fish. See *SEA-devil*.

ROSS, ALEXANDER, in *Biography*, was born at Aberdeen, and became master of the grammar-school at Southampton, and chaplain to king Charles I. His works are numerous, of which the best known is "A View of all Religions;" and a curious performance, called "Virgilius Evangelizans," taken wholly from the *Æneid*. He died in 1654, aged 61.

ROSS, JOHN, a learned prelate, was born in Herefordshire, and educated at St. John's college, Cambridge, where he took his degree of D.D. in the year 1756. He had some years previously to this published a pamphlet in defence of Dr. Middleton against the criticisms of Dr. Markland, and in 1749 an edition of Cicero's "Epistolæ ad Familiares," in two vols. 8vo. He was presented to the vicarage of Frome, in Somersetshire, and in 1778 he was advanced to the bishopric of Exeter. He died in 1792.

ROSS, JOHN LOCKHART, the fifth son of sir James Lockhart, was born in November 1721, and having manifested an inclination for the sea-service, he was, at the age of 14, placed under captain Osborn, who then commanded his majesty's ship the *Portland* of 50 guns, which sailed in September 1735, for Constantinople. He served in several different ships, and under different commanders, till 1743, when he was advanced to the rank of lieutenant. It was not till 1755 that he was appointed to a command, which was in the *Savage* sloop of war, of 12 guns and 70 men. In a very short time he took a *St. Domingo* merchant-man, valued at 30,000*l.* In the following year he was appointed to the command of the *Tartar* sloop of 24 guns, and 200 men. War was now declared against the French, and on the 20th of September he chased and engaged two French frigates of 28 guns, and drove them into Morlaix. Without particularizing the instances of his success, we may observe that, between the 20th of September 1756 and the 19th of October 1758, he took nine privateers, containing 220 guns, and about 2500 men, with the loss of only five men killed and two wounded in the different engagements. At length the name of captain Lockhart was almost sufficient to terrify the enemy to strike. The following fact, which stands upon the most indubitable authority, shews in what manner he was regarded on the seas. A privateer belonging to Bristol, called the *King George*, and commanded by a Mr. Read, having fallen in with an enemy's ship of far superior force, during the night, and finding that the exigencies of her situation demanded the most prompt and vigorous exertions to preserve herself from capture, the commander ran with great spirit along-side, and hailing the enemy, commanded her to strike to the *Tartar*, captain Lockhart, and was instantly obeyed without the smallest hesitation. Captain Lockhart's conduct in protecting the trade of the country was so meritorious, that the magistrates of Plymouth, immediately after his return to port, voted him the freedom of their corporation to be presented him in a gold box. A present equally honourable was made him

the ensuing year, by the merchants and underwriters of London, which consisted of a silver cup and salver, curiously chased, and embossed with his arms, and the representation of the *Tartar*, and the several privateers which had been captured by him.

In 1759 he was promoted to the *Chatham* of 50 guns, and had two smaller vessels put under his command. In a short cruise he took the *Arethusa*, a French frigate of 32 guns. In the following year he was promoted to the *Bedford*, a third rate, but did not long retain the command. In the same year, by the death of a brother, he changed his name to Rofs, and was elected a representative in parliament. It was not till 1777 that he was called again to serve his country in the sea-service. In that year he was employed under the orders of admiral Keppel, in the famous battle on the 27th of July. (See *KEPPEL*.) In 1779 he was raised to the rank of rear-admiral of the blue, and appointed fourth in command of the Channel fleet, having hoisted his flag on board the *Royal George* of 100 guns. About this period he succeeded his brother to the dignity of a baronet. He next accompanied sir George Rodney on his fortunate expedition, undertaken for the relief of Gibraltar. After his return he went but little to sea; but in 1787 he was advanced to the rank of vice-admiral of the blue; and here closed the professional career of sir John Lockhart Rofs, who, considering his great zeal and activity in the prosecution of the duties of his profession, and the vast benefits which the commercial interests of his country reaped from his exertions, must be allowed to rank very high in his profession. His coolness and intrepidity in the hour of battle were never surpassed; and, in the course of a very long service, to fight and to conquer were alike habitual to him. He died in June 1790, after a lingering and painful illness; and his remains were interred in the Rofs aisle, forming the east end of the church of Fearn, which had been the burying-place of all the respectable families of the name of Rofs for many ages. Stockdale's edition of *Campbell's Lives of the Admirals*, vol. vi. Charnock's *Biographia Navalis*, vol. vi.

ROSS, in *Geography, a borough and market-town in the lower division of the hundred of Greytree, county of Hereford, England, is seated on a commanding eminence, overhanging the river Wye, at the distance of 15 miles S.E. by E. from the city of Hereford, and 121 W. by N. from London. This town was made a free borough by king Henry III., and seems to have been a place of more importance formerly than at present. In the time of Camden it was famous for its cyder, and for the manufacture of iron wares. Its celebrity for cyder yet continues, but the last-mentioned branch of trade has much declined. According to the parliamentary returns for 1811, Rofs contained 558 houses, and a population of 2261 persons. The market-day is Thursday, weekly; and the fairs are on Holy Thursday, Corpus Christi, 20th July, Thursday after 10th October, and 11th December. The petty sessions for the hundred of Greytree are held here. The government of this borough is vested in a serjeant and four constables, but their powers are extremely limited. Here are two charity schools, and an alms-house; the latter of which owed its establishment to John Kyrle, whom Pope has characterized and invested with deathless and truly merited fame, by the name of "the Man of Rofs." This truly benevolent character was born at White House, in the parish of Dymock, Herefordshire, in 1637; served the office of sheriff for the county in 1683, and died in 1724. Though possessed only of an annual income of 500*l.*, he not only lived in happiness and respectability himself, but diffused around him innumerable*

merable benefits to the poor and the unfortunate. Among other advantages conferred by him on Ross, he raised the church spire above 100 feet in height, and inclosed a piece of ground with a wall, and sunk a reservoir in the centre of it, for the use of the inhabitants. He likewise constructed a fine broad causeway at the western extremity of the town. The house in which Mr. Kyrle resided was afterwards the King's Arms, situated near the entrance of the town from Gloucester, but is no longer an inn.

The streets of Ross are mostly situated on the top and slope of a hill, and are extremely narrow. The market-house, though erected so late as the reign of Charles II., is in a very decayed state. It is constructed of stone, and displays the heterogeneous mode of building prevalent in the reign of his predecessor, James I. The church is a handsome structure, having a tower, surmounted by a lofty spire at its western end. In the window over the altar here, among other fragments of painted glass, is one representing a bishop, with the inscription, "Thomas Herefordensis," written beneath in black letter. This bishop had probably been a benefactor to the church. The views from the surrounding cemetery, and from the contiguous prospect ground, are much celebrated. Immediately below, the river Wye forms a fine semicircle, at one of the extremities of which are the ruins of Wilton castle; and beyond it an extensive vale, terminated by distant mountains. Near the church-yard is a spot called Bishop's-Court, from the circumstance of its having been anciently the site of a palace, belonging to the bishops of Hereford.

The ruins of Wilton castle above-mentioned stand on the western bank of the Wye. This mansion was for several centuries the residence of the Greys, of the fourth, who derived from it their original baronial title, in the reign of Edward I. soon after they acquired possession of it. Its present ruinous condition is to be attributed to the royalist governors of Hereford, by whose orders the whole interior was consumed by fire. The seats and objects of antiquarian interest in this vicinity are numerous. On the summit of Eaton-hill, about two miles to the north of Ross, is a large encampment, probably of Roman origin. The intrenchments are in a very perfect state, and are of great depth. A farm-house here displays vestiges of an ancient mansion, and the surrounding grounds are still designated the Park of Eaton; but the history of the place is entirely lost. At a hamlet called Hole-in-the-Wall, about a mile further to the north, are some foundations of walls, which bear the appearance of great antiquity. What occasioned the appellation by which their site is distinguished, is an excavation formed in the rocky bank of a neighbouring garden, which, when complete, led by a flight of steps downwards into a cavity, whose roof was supported by a single column. Ascending the hill towards Old Gore is a hollow space extending about 100 paces, in which a number of celts were discovered a few years ago. These instruments were nearly of the same size, and had evidently been cast, as the marks of the mould were visible. On the opposite side of the river from Hole-in-the-Wall, stands Kington-house, long the property of the Hoskyns' family; one of whom, serjeant Hoskyns, is said to have entertained here James I. with a morrice-dance, performed by ten persons whose united ages exceeded one thousand years. Above this mansion is Fawley-Court, anciently the seat of sir John Kyrle, progenitor to the "Man of Ross," and now the property of a gentleman named Money, a descendant from the family by the female line. Goodrich castle is situated about four miles to the south of Ross, on a finely wooded promontory, round which

the river Wye forms a semi-circular sweep. This fortress was for many years the baronial residence of the Talbots, earls of Shrewsbury. By whom it was originally founded is unknown, though the near affinity of its name to that of duke Godric, who occurs as a witness to two charters granted by king Canute, renders it not an improbable conjecture that he was the person. Nothing of its authentic history is recorded till the reign of king John, where we find it mentioned as the property of William Strigul, earl marshal, who died here in 1246. Subsequently it was conveyed by a female heir to William de Valentia, earl of Pembroke, from whose family it passed to the Talbots, afterwards earls of Shrewsbury. Elizabeth, daughter of Gilbert, the seventh earl, carried it by marriage to Henry de Grey, earl of Kent, whose descendants held it till the death of Henry, duke of Kent, when it was sold to admiral Griffin, ancestor to the present proprietor. Few events of historical note are related respecting this castle. In the civil wars between king Charles I. and his parliament, it was at first garrisoned for the latter, but was captured soon after by the royalists, who, in their turn, were compelled to surrender it to the republicans, after a siege of six weeks, A.D. 1646. On the 25th of August, in the same year, the parliament ordered it to be notified to the countess of Kent, that it was necessary the castle should be demolished. Accordingly it was dismantled in March following; and has since been gradually falling to decay, but enough of it yet remains to point out its former extent and grandeur. The form of this structure is that of a parallelogram 176 feet long, by 152 broad. Each of the four angles is strengthened by a round tower, and in the south-west part of the area is a square keep, which appears to be of anterior date to the rest of the building. "This keep tower," says King, in his *Munimenta Antiqua*, vol. iii. "has every mark in its style of architecture of being coeval with the Saxon age." It consists of three stories, the lowest of which was used as a prison. The principal entrance was by a flight of steps, which is detached from the main building, and conducts to a platform before the door-way into the second and principal story, which has no interior connection with the dungeon beneath, as happens in most Norman castles. The entrance to the prison-apartments was under a very remarkable sort of pointed arch, formed of "quite flat sides, which seem, from the appearance of the wall around, and from its peculiar style, to have been inserted many ages after the keep was erected, and in the time of Edward III.;—a suspicion that appears to be most strongly confirmed by the circumstance, that about the twenty-second year of the reign of that king, Richard Talbot, its then lord, obtained the royal licence for having in his castle a prison for malefactors; having also the cognizance of pleas of the crown, &c. within his lordship of Irchenfeld and Wormilow." The windows in the two upper stories are said, by the same author, to be genuine Saxon; and that in the middle of the higher story seems to have continued unaltered from the period of its construction. The columns on each side stand within the arch, the semicircular part of which is ornamented with zigzag: this window terminates the middle projecting buttress that assists in supporting the tower; and under it is a zigzag moulding, or band, which is carried round the whole building. The window in the middle story is nearly similar to that described; but a stone frame for glass is inserted in it, apparently of the age of Henry VI., and probably the work of the celebrated earl Talbot, who, according to tradition, had his private chamber in this keep. The other portions of the castle are of much later erection than the keep. The entrance was very strongly fortified. Immediately in front,

and within the space inclosed by the surrounding fosse, was a very deep pit, hewn out of the solid rock, and having a drawbridge thrown across it, which, when drawn up, exactly fitted the space between the towers on each side of the gateway, which was further defended by two massive gates and portcullises, and by loop-holes, and machicolations in the vaulting, through which boiling lead and water were poured down on the heads of assailants. This passage opened into the great inner court, on one side of which stands the chapel, now in ruin; and near it is a small octagonal watch-tower, which rises higher than any other building within the castle. Adjoining the entrance to the keep is the garrison tower, which is thirty-six feet square at the base; "but the three outward angles diminish as they ascend and form triangular buttresses, so that the upper part of the tower is circular." From the keep a wall formerly extended to the west, or Great tower, which is circular in its outward form, but octangular within. Between this and the north, or Ladies' tower, were ranged the state apartments. The hall was a magnificent room, 65 feet long and 28 broad, and appears, from the pointed style of its windows, to have been erected in the reign of Edward I. or II. It communicated, towards the north, with a kind of anti-chamber, whence a passage led into the great state-room; the northern end of which exhibits two most beautiful pointed arches, of a later date than the rest of the apartments. The Ladies' tower occupies a high and steep precipice to the north of this building, and is hence the most defensible part of the castle. Its name clearly indicates its appropriation as the residence of the female part of the garrison. See a plan and views of Goodrich castle, in Bonner's Perspective Itinerary; with historical and descriptive accounts.

Three miles eastward from Rofs is Rose, or Bury-hill, where some antiquaries have placed the Ariconium of Antoninus, which Camden had fixed erroneously at Kenchester. The site of this station is strongly marked by the colour of the soil, which is extremely black within its area, while all around it is inclined to red. About sixty years ago, the ground here was covered with rubbish, and overgrown with briars, &c. but the then proprietor soon afterwards inclosed and levelled it. In the course of that operation, many Roman antiquities were discovered by the workmen; such as fibulæ, lares, lacrymatories, rings, coins, fragments of pillars, and of tessellated pavements, innumerable pieces of red pottery, and some foundations of buildings. A field near this station retains the name of Kill-Dane-Field, but the particulars of the event to which it alludes is unknown. About a mile to the south-west is the site of Eccleswall castle, now occupied by a modern mansion; and still more to the south, and somewhat nearer to Rofs, are the remains of Penyard castle, which appears to have been constructed for the defence of the narrow pass through the woods from the county of Gloucester, into those of Monmouth and the principality. This fortress was demolished during the civil wars. It had formerly a park and chace attached; and the latter appellation is still given to an eminence which rises to the westward of the castle. Beauties of England and Wales, vol. vi. by E. W. Brayley, and John Britton, 8vo. 1805. King's Munimenta Antiqua, vol. iii. fol.

Ross, a bishopric in Ireland, united with Cork by queen Elizabeth in 1586. It contains 124,000 acres, all in the county of Cork, in 33 parishes.

Ross, a post-town of Ireland, in the county of Cork, distinguished by the name of "Rofs Carbery." It is situated on a bay or harbour, to which it gives its name, but which is choked up with sand. The town is situated on a rocky

eminence projecting to the south, and nearly surrounded by a strand. In the centre of the town is a pretty large square, with four narrow streets diverging from its angles. It is chiefly inhabited by weavers, and a good deal of linen yarn is sold here. In former times a school was founded here by St. Fachnan, which was much frequented. It is 155 miles S.W. from Dublin, and 32 from Cork.

Ross, *New*, a sea-port and post-town of Ireland, in the county of Wexford. This, according to Mr. Wakefield, appears to be a spot well adapted for becoming a place of great commercial importance. It is situated at a considerable distance from the coast on the river Barrow, which has a sufficient depth of water to allow vessels of large size to unload at the quay. Not far remote is the junction of this river with the Nore, the latter of which conveys merchandise to Thomastown, within a few miles of Kilkenny, while the former affords a communication by canal to Dublin. The Barrow is also united to the Suire, which is navigable to Clonmell. Notwithstanding these advantages, Mr. W. states Rofs to be in a state of inactivity, *without trade or capital*. Other writers speak of it as a flourishing place, the buildings numerous and elegant, and the population rapidly increasing. Rofs is a corporate town, and one of the staple ports for the exportation of wool. To the former circumstance Mr. Wakefield attributes its decline. It sends a member to parliament, under the influence of the marquis of Ely. There is a charter school for 60 boys. It is called New Rofs, to distinguish it from another, now a mere village, a few miles distant. New Rofs is $67\frac{1}{4}$ miles S.S.W. from Dublin.

Ross, a county of the state of Ohio, divided into 11 townships, and containing 15,514 inhabitants.—Also, a town of Washington county, Pennsylvania, containing 1327 inhabitants.

Ross, a small island near the W. coast of Scotland, and county of Argyle; 6 miles N.N.E. of Cambeltown.

Ross-Island, lies in the lake of Killarney, county of Kerry, Ireland, in which is a rich vein of grey copper ore, with copper pyrites, galena, and blende, the working of which has been prevented by an influx of the waters of the lake. A castle on this island has a military governor.

Ross's Island, a small island in the Mergui Archipelago. N. lat. $10^{\circ} 44'$.

Ross of *Balmagar*, a cape of Scotland, on the S. coast of the county of Kircudbright, at the mouth of the Dee; 4 miles S. of Kircudbright.

ROSSA, a small island near the W. coast of the island of Corfica; 10 miles N.E. of Calvi.—Also, a small island in the Mediterranean, near the N. coast of Sardinia. N. lat. $41^{\circ} 15'$. E. long. $9^{\circ} 25'$.

ROSSAL POINT, a cape of England, on the coast of Lancashire; 2 miles W. from the mouth of the river Wyre.

ROSSANO, a city of Naples, in Calabria Citra, the see of an archbishop, formerly the most celebrated rendezvous of Basilian monks in Italy; 27 miles N.N.E. of Cosenza. N. lat. $39^{\circ} 38'$. E. long. $16^{\circ} 44'$.

ROSSARNO, a town of Naples, in Calabria Ultra, on the Metrano; 4 miles S.E. of Nicotera.

ROSSBACH, a town of Saxony, in Thuringia, near which Frederic II. king of Prussia, gained, in the year 1557, a glorious victory over the combined armies of France and Austria; 5 miles N.W. of Weissenfels.

ROSSBACH, *Ober*, a town of Upper Hesse; 2 miles S.W. of Fridberg.

ROSSBACH, *Nider*, a town of Upper Hesse, near Ober Rosbach.

ROSSCHOCHA, a river of Russia, which runs into the Indigirka, N. lat. $67^{\circ} 50'$. E. long. $140^{\circ} 14'$.

ROSSDEOGHAN, a small island on the W. coast of Ireland, in Kenmare river; 10 miles N.E. of Lamb's Head.

ROSSDORF, a town of Bavaria; 12 miles N.E. of Bamberg.—Also, a town of Germany, in the county of Henneberg; 10 miles N.W. of Meinungen.

ROSSE, in *Ichthyology*, the name given by Bellonius to that kind of cyprinus of Artedi, which we call the roach.

ROSSEL, in *Geography*, a town of Prussia, in the province of Ermeland; 50 miles S.S.E. of Königsberg. N. lat. $53^{\circ} 57'$. E. long. $21^{\circ} 11'$.

ROSSELARE, a town of France, in the department of the Lys; 3 miles N. of Grammont.

ROSSENAW, a town of Austria; 2 miles N.W. of Zwettl.

ROSSENBERG, a town of the margraviate of Anspach; 8 miles N. of Anspach.

ROSSENDORF, a town of the margraviate of Anspach; 2 miles N.W. of Cadolzburg.

ROSSI, GIAN-VITTORIO, in *Biography*, an Italian man of letters, was born of a good family at Rome, in 1577. He was educated under the Jesuits of the Roman college, where he joined the studies of the law and philosophy to that of polite literature, but being disappointed in his expectations with respect to the first of these pursuits, he limited his attention to the last. He became a member of the academy degli Umoristi, of which he was one of the most zealous promoters, and gave such proofs of ability in its exercises, that several advantageous offers of employment were made to him. He, at length, accepted the post of secretary to the cardinal Andrea Peretti, with whom he resided twenty years. After the death of that prelate he retired to a solitary villa on mount Sant' Onofrio, where he lived in tranquillity to himself, and engaged in his studies, till he died in 1647, at the age of 70. He was much esteemed by the men of letters at Rome, as well as by many persons of rank, among whom was the cardinal Chigi, afterwards pope Alexander VII. Rossi, who is better known by his classical name, Erythreus, was author of several works. His first publication was a kind of satire on the corrupt manners of the Romans, entitled "Eudemie Lib. X." He also published two volumes of "Epistles," addressed to cardinal Chigi, under the name of Tyrrenus, and two others to different persons; also various dialogues on moral topics, orations, and other tracts, which are all in the Latin language. His chief work is entitled "Pinnotheca Imaginum illustrium Virorum," being eulogies or biographical accounts of many learned men his contemporaries. Gen Biog.

ROSSI, PASQUALE, called *Pasqualino of Vicenza*, by long practice after the best Venetian and Roman pictures, acquired, without a master, a considerable power of design and colour. Few of his public works remain; one of the best is a St. Gregorio in the dome of Matelica. In galleries we meet with his cabinet pictures, representing conversations, gaming parties, concerts, and similar capricci, highly elaborate, and of Flemish finish.

ROSSI, LEMME, published in 1666, at Perugia, in quarto, a work entitled "Sistema Musico," or Speculative Music, explaining the most celebrated system of the ancients in all the genera. This is one of the clearest and best digested treatises on harmonics that was produced in Italy during the 17th century.

ROSSI, MICHAEL ANGELO, a dilettante or gentleman-performer on the violin, who, in the part of Apollo, in

1632, accompanied himself on that instrument in a musical drama at Rome, entitled "Il Ritorno di Angelica nell' Indie," to the great delight of the audience. It appears that Stradella, who sung in his own oratorio of St. John the Baptist at Rome, led the band, and accompanied his own voice on the violin.

ROSSI. See LUIGI.

ROSSI, LA PASQUA, a female singer in the conservatorio of the Incurabili at Venice in 1770, who performed in a motet by Galuppi under his own direction, in a very superior manner. Italian Tour.

ROSSI, FRANCESCO DI PUGLIA, an excellent musical composer of the old school, who produced the following three operas, that were much admired in their day: "Sejano moderno della Tracia," 1636; "La pena degli Occhi," 1688; and "La Corilda, o l'Amor trionfante della Verdetta."

ROSSIGLIONE, ALTO, in *Geography*, a town of the Ligurian republic; 17 miles N.W. of Genoa.

ROSSIGLIONE, *Basso*, a town of the Ligurian republic; 15 miles N.W. of Genoa.

ROSSIGNOL, a considerable lake of Nova Scotia, between Liverpool and Annapolis, said by the Indians to be the main source of the Liverpool and Petit rivers.—Also, a port on the S. coast of Nova Scotia, S.W. of Port de l'Heve.

ROSSIGNOL, in *Ornithology*. See MOTACILLA *Lucinia* and *Phenicurus*.

ROSSINA, in *Geography*, a town of the duchy of Parma; 14 miles S.S.E. of Parma.

ROSSITA, a river of European Turkey, which runs into the Jantra, near Nicop, in Bulgaria.

ROSSITTEN, a town of Prussia, in the province of Samland, on the Kuritsch Nerung; 18 miles N. of Königsberg.

ROSSITZ, a town of Bohemia, in the circle of Chrudim; 8 miles N.N.W. of Chrudim.

ROSSLA, a town of Germany, in the principality of Weimar; 6 miles N.E. of Weimar.

ROSSLEBEN, or ROSSEL, a town of Saxony, in Thuringia; 3 miles N.N.E. of Wiehe.

ROSSLYN, *Earl of*, in *Biography*. See WEDDERBURN.

ROSSMORE, in *Geography*, an island in Kenmare river, county of Kerry, Ireland, about 6 miles W. of Kenmare town.

ROSSO, CAPE, a cape on the E. coast of the island of Metelin. N. lat. $39^{\circ} 18'$.

ROSSOCKEN, a town of Prussia, in the province of Oberland; 25 miles S.W. of Ortelsburg.

ROSSOMAKA, in *Zoology*. See *URSUS Gulo*.

ROSS-SHIRE, a county or district of Scotland, including the small dispersed county of Cromarty, which united, form one sheriffdom, though separated licutenancies, is situated between $57^{\circ} 7' 40''$ and $58^{\circ} 7' 20''$ north latitude. It is one of the largest shires in North Britain, and extends about eighty miles in length, and seventy-eight in breadth. The whole comprehends 3799 British square miles, of which 562 are in the isle of Lewis, and 344 in Cromarty. Ross-shire stretches across the whole of Scotland, from the northern to the western ocean, and has annexed to it, besides the isles of Lewis, Barra, and Rona, the Sulisker-rock, and the Flannan and Shaint isles, which will be found to be noticed under their respective names. It is bounded on the north by the county of Sutherland, on the east by the Moray and Cromarty shires, on the south by the county of Inverness, and on the west by the Atlantic ocean.

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According to the population returns of 1811, the united counties contain 13,280 houses, and 60,853 inhabitants.

Historical Events.—Ross-shire, in very remote times, constituted part of the Pictish kingdom. At a later period, when the Norwegians obtained possession of the Orkneys, and subdued the neighbouring counties of Caithness and Sutherland, it seems to have shared the usual fate of frontier provinces, and to have belonged alternately to the Norwegians and to the Scotch. According to the Icelandic writers, it made part of the dominions of the earls of Orkney; but in the "Descriptio Albanix," both the counties of Ross and Moray are mentioned as comprehended within Scotland; and other accounts state that part of Ross-shire was possessed by the princes of the Hebrides, or lords of the Isles. The truth probably is, that, favoured by their peninsular situation, the inhabitants of Ross paid little respect to the authority of any of their powerful neighbours. Ross-shire formed a comitatus, or earldom, as early as the 11th century; but of the history of its first earls scarcely any authentic document exists. What is remarkable, however, contrary to the custom in most other feudal possessions, this earldom seems to have descended to heirs female as well as to heirs male. Hugh, one of the earls of Ross, was slain at the battle of Halidon-hill, in 1333. William, his son, succeeded, who appears to have had some claim to the Western isles, as in a variety of charters, yet extant, he is styled earl of Ross, and lord of Skye. This nobleman slew Raynold of the Isles in a fray at Perth; but in endeavouring to establish a right to his possessions by force, he was completely thwarted. William left issue an only daughter, who married Walter Leslie, and thereby gave him a title to the earldom. His son and successor, Alexander, espoused one of the daughters of the regent of Scotland, Robert, duke of Albany, and had by her a daughter, Euphemia, who, while a child, was induced to resign her rights to the regent's son, who thereby became earl of Ross and Buchan. He did not, however, long enjoy his honours and possessions in quiet, for on the death of Euphemia, as is generally believed by poison, Donald, lord of the Isles, asserted his title to the earldom of Ross, and being received by the inhabitants, not only succeeded in obtaining possession of the district, but extended his dominions as far southwards as the Grampian hills, and transmitted them to his posterity. John, his son and successor, who lived in the middle of the 15th century, was one of the most powerful chieftains of his age. He used the title of an independent prince, made treaties with Edward IV. of England, &c.; and, indeed, the extent of his territories might well justify such conduct, as his sway was acknowledged over at least a fourth part of the whole kingdom of Scotland.

General Aspect.—On the eastern coast of Ross-shire, to a short distance from the sea, the country is comparatively flat, and being chiefly inhabited by persons speaking the English language, has been long considered to be part of the lowlands of Scotland. This tract is extremely fertile and well cultivated, and abounds with seats belonging to opulent and respectable proprietors, by whose exertions it has been greatly improved of late years. The climate is more favourable to agricultural pursuits than in most of the northern districts of our island; so likewise is the soil, which, in many parishes, is a deep loam, capable of yielding very large crops of wheat. In short, such are the natural advantages of this narrow tract, that it is considered little inferior to Fifeshire, either in point of soil or climate. Unfortunately, however, the portion of it susceptible of arable culture, though nearly sixty miles in length, rarely exceeds a mile and a half in breadth, except in the parishes

of Nigg and Tarbet. The soils here are, of course, various. In the parishes of Fodderty, Dingwall, Kiltearn, Nigg, and Eastern Fern, a rich deep loam prevails. About Contin, and in the parishes of Alness, Rosekean, and Kilmuir, the soil is light, but sufficiently favourable for general crops. The other portions consist of a constant succession of lofty mountains. The central district, however, may be justly described as a beautiful Highland country, the hills being covered with a profusion of grass, and every where intersected by straths, or valleys, many of them extremely rich and fertile; but on approaching the western coast the general aspect is uninviting. The traveller who climbs a mountain beholds around him a prospect exhibiting a desolate and dreary region, where nothing can be seen but vast rocky mountains, with summits broken, serrated, and springing into various forms. Yet amidst these hills, so dreary to the sight, and producing little but heath, some valleys, at once beautiful and fertile, intervene, which might be cultivated with advantage, did not the climate to which they are subjected deter the inhabitants. During March and April, the weather is commonly friendly to the operations of the husbandman. In the autumnal months rain falls in such quantities, as to lay the ripening corn flat upon the fields, and to swell every trifling stream into a torrent, by which the lands are stripped of their produce, and sand and stones are substituted. The fair days in this district, according to a register kept at Lochalsh, are estimated at 143 in number annually; but in the months of August, September, October, and November, not more than five days in thirty are free from rain. The soils in the valleys, both here and in the middle district, are mostly alluvial, and partake, in general, of those of the nature of the surrounding mountains. At the head of the bay of Applecross the soil is sandy; and on its southern side rests on lime-stone. At Keeshorn it is of the same description, and very fertile. The soil of Terridon is light and gravelly, with the exception of a few patches of moss; which have lately been brought into a state of cultivation. At Loch Carron, a great variety of soil may be observed within a very limited space. On the flat spots along the shore the soil is light and stony; on the higher and sloping grounds, a sandy loam; and at the head of the loch it is of a loose clayey consistence.

Mineralogy.—The mineral products of these counties are but very little known, because the subterranean contents have hitherto been but little investigated. Coal is indicated in every part of the Black isle, in Cromarty, and throughout all the eastern parts of Ross-shire. Lime-stone is abundant on the western coast, where it is least wanted, and is likewise partially found at Kirkan, and in the eastern district, particularly in the vicinity of Geanies and Cadboll. Copper has been wrought in primary lime-stone near Keeshorn; but the mine is for the present abandoned. In the parish of Kiltearn, small quantities of lead-ore have been discovered; and a vein of the same metal, very rich in silver, appears in the parish of Alness. Here also is a stratum of iron-stone, which is plentiful in most parts of the eastern district. At Poolew yet remain the ruins of a large smelting-furnace, the existence of which shews the manufacture of iron to have been once an important business in that part of the country. Marle has been found in large quantities in the same district, particularly at Culrain, near the sea; and on the west coast, in the parish of Lochalsh, is an immense bank of shell-sand, the right of property in which has been for many years a subject of litigation between Mr. Innes of Lochalsh, and the clergyman of the parish, Mr. Downie, the former contending that it belongs to him as proprietor of the estate of Lochalsh, and the latter, that it lies within

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within fea-mark, and is therefore *inter regalia*. In the parish of Kincardine stands one of the loftiest mountains in Ross-shire, called Carnchuinaig, on which stones have been found perfectly similar to those known by the name of Cairngorums.

Knockirny, another hill on the borders of the same parish, produces excellent marble, both white and parti-coloured. The other loftiest mountains in Ross-shire are, Tulloch-Ard, in the district of Kintail; Ben-Uaish, in the parish of Kiltearn; and Scuilm-a-bharra, in the parish of Kincardine. That of Tulloch-Ard claims particular attention on account of its importance in remote times. "Like the temple of Janus of ancient Rome, it indicated peace or war; for when war commenced, a barrel of burning tar, on the highest peak, was the signal; and in twenty-four hours all the tenants and vassals of Seaforth appeared at the castle of St. Donan, armed *pro aris et focis*. This mountain is the crest of Seaforth's arms."

Lochs and Rivers.—The eastern coast of the united counties of Ross and Cromarty is washed by three large arms of the sea, the Dornoch, Cromarty, and Murray friths.

On the western coast there are eight arms of the sea, stretching for many miles up the country. These are, loch Broom, Little loch Broom, loch Greinord, loch Ew, loch Torbidon, loch Carron, loch Daich, and the Gairloch; all of them the usual resort of vast shoals of herrings. Gairloch has likewise been celebrated, during several centuries, for the cod-fishing. One proprietor, only, sends on an average 40,000 fish of this kind to market annually. The principal fresh-water lakes are loch Maree, and loch Tannich, the former about fifteen miles long, and the latter seven; besides which there are above twenty less considerable lakes, and a great number of small ones. These abound with fine trout and pike, and in some are charrs. In loch Maree is found that species of trout called the gizzard trout. This loch is adorned with twenty-four small islands, planted with fir-trees, and other kinds of wood. The largest rivers on the western coast are the Ew, the Carron, and the Broom, which fall into the respective lochs of the same names. The first-mentioned of these is frequented by prodigious numbers of salmon, and is perhaps the best angling stream in Britain. Salmon are likewise plentiful in the Carron, and at Ullapool. On the eastern coast the chief rivers are the Conan, the (east) Carron, the Alnefs, and the Oikel. The Conan and Alnefs fall into the Cromarty frith, which also receives several minor streams. The Carron empties itself into the Dornoch frith, as does likewise the Oikel, which forms the boundary between the counties of Ross and Sutherland. The salmon fisheries on all these rivers are very productive. The river Beaulie, which flows into the Murray frith, is the boundary of the county for several miles on the Invernessshire side.

There is a variety of sulphureous and chalybeate springs in Ross-shire. The spring at Strathpeffer, which is sulphureous, is most remarkable, on account of the very great resort of Highlanders and strangers to drink its waters from a belief in their medicinal qualities for the cure of cutaneous disorders, and of barrenness in women.

State of Property.—The value of land in these counties, as in most parts of Great Britain, has vastly increased within the last twenty years. Numerous farms, which, at the commencement of that period, were rented at little more than 200*l.* per annum, have been leased since 1805, as high as 800*l.* or 1000*l.*; and their monied price, when they have been brought to market, has held a proportional elevation. Landlords, trusting to ignorant surveyors, when about to let their lands, generally put a value on them, which expe-

rience has woefully shewn to be far beyond their intrinsic worth. Hence distress arose among the farmers, even when food was at its highest pitch, and most of them were consequently compelled to throw up their leases, or to obtain a considerable reduction of rent.

Most of the estates in Ross and Cromarty shires are held directly under the crown, vice the earls and bishops of Ross. The few duties formerly paid to the earls and bishops are now levied for the government; and being payable chiefly in kind, convertible at the fair price of corn, they have become a very heavy burthen on the estates from which they are taken. Until lately almost every extensive proprietor committed the management of his estate to a factor, but the evils of this practice have at length begun to operate a cure. "There can be no doubt," observes sir George Mackenzie, in his "General View of the Agriculture" of these counties, "but that the crowded population of the Highlands, and their consequent slow improvement, must be attributed, in a great measure, to the extensive power given to factors." The late factor of the proprietor of Lochalsh, by his injudicious conduct, involved his employer in numerous litigations with the minister of the parish, and with his tenants, some of which have been depending for upwards of nine years. The principal landholders are the heirs of the late lord Seaforth, Mr. Innes of Lochalsh, sir Hugh Monro of Fowls castle, sir Alexander Munro of Novar house, sir Hector Mackenzie of Conanide, sir Roderick Mackenzie of Roschaugh, sir Charles Ross of Balnagown castle, and Alexander Ross, esq. of Cromarty house. This mansion is by far the most elegant, and the best laid out building of any in this part of the united kingdom, but the pleasure-grounds have been much neglected.

Agriculture.—The proprietors of the eastern district of these counties are very spirited in improving, and follow every species of good husbandry practised in the south. Farmers of the superior class begin to imitate their example; but the smaller tenants are far behind. The usual grains cultivated on the arable lands are bear, oats, potatoes, pease and beans, and, along the shore, wheat. Every rotation customary in the south has been tried; but the want of markets within the county has induced many to lay their farms down with grass. The grasses generally sown, both for hay and pasturage, are red and white clover, with a mixture of rye-grass and rib-grass. The ordinary rotation practised by the small tenants, and which they have uniformly pursued for centuries, is bear, or bigg, with manure, followed by two crops of oats, or sometimes pease, and always a quantity of potatoes; on which root their families are chiefly maintained during nine months of the year. The gentlemen, and more extensive farmers, use lime, marle, and shelly-sand, as manure. The smaller tenants make a compost at the rate of one load of dung to three of earth, which they deposit for some time in pits, and then spread in February on the stubble land. The manure is then ploughed down, and another ploughing is given towards the end of April, when they sow their bear, or bigg. The shelly-sand on the west coast is reckoned a very valuable manure; it lasts from twelve to fifteen years, and has the effect of converting a light brown insipid soil into rich black loam. The size of farms here is various. The native farmers occupy from seven to thirty-seven acres of arable land; and, in some instances, have small grazings contiguous to their arable fields; but, for the most part, the horses and cattle employed in the labour of the farms are sent, as soon as seed-time is over, to graze during summer on some hill pasture, for which five or six shillings per head are paid. The gentlemen, and better sort of farmers, possess from 300 to 800

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acres, which are in general inclosed; but the rest of the country is almost entirely open field. Among the smaller tenants leases usually run from five to seven years, at the end of which an increase of rent is most frequently demanded. This limitation of leases greatly retards improvement; for the tenant can reap but little benefit from his labour in so short a space of time; and if he has done any thing more than his neighbours, his farm is coveted, and he must either give a greater increase of rent than it can properly bear, or remove. There are some estates, however, in the leasing of which a different practice has been adopted, to the mutual advantage of the landholder and the tenant.

The central and western districts of Ross-shire may be considered as exclusively devoted to pasturage; the small quantities of arable lands in the vallies bearing but a very insignificant proportion to the extent of the country. Till within the last thirty years these districts were inhabited by a number of small farmers who maintained themselves and their families from the produce of the little spots they had to cultivate, and who, in favourable seasons, were enabled to pay the trifling rent imposed by the landlord, from the profit of the cattle they possessed. These extensive districts, particularly the central district, are now converted from cattle into sheep farms; and there is no question of their superior adaptation to the latter species of stock. For every pound of beef which a Highland cattle grazier can send to market, a shepherd can at least bring three pounds of mutton. The wool also furnishes the staple for a useful and important branch of manufacture. Hence the shepherd can afford a double rent with ease; and there can hardly exist a doubt that property in the Highlands will, in process of time, be tripled, or even quadrupled, by sheep farming. The result, however, upon the population of the country is becoming more and more evident. In proportion as capital is acquired, farms augment in magnitude, and a smaller number of people find employment and support within a given space.

Live-Stock.—The cattle reared in the low parts of these counties are chiefly intended for the dairy, and are a mixed breed. The oxen and old cows are commonly fattened for the butchers of Inverness and Fort George. The breeds of sheep kept are various. The pure Cheviots, a mixture of that breed with the Leicester, and a mixture of the latter with the old white-faced horned breed of the country, are frequently met with, and also the pure Leicester. Some gentlemen have introduced the South Down and the Merino, and have successfully attempted crosses of these with the Cheviot breed. The mountain breed is not larger than ponies, but by care and attention in breeding, the size and utility might be greatly augmented. The breed of hogs kept by gentlemen for their tables, is that of China; but the country people chiefly rear the large common sow. Turkeys, ducks, pea fowls, Guinea fowls, and common fowls, are reared by most of the families residing in the country, but only to supply their own consumption. Pigeon-houses are very frequent; and bees are beginning to attract considerable attention.

Roads.—Through the cultivated parts of the county the roads have been long noted for their excellence, though there were no other means for making or repairing than the ordinary statute labour. About seven years ago, however, a bill for converting the statute labour into money was presented to parliament, and passed into a law. By this act, the post-road from the borders of the county of Ross, near Beauly, to its termination at the Frith of Dornoch, is to be made turnpike; and authority is given for the erection of toll-gates every six miles. The materials for making roads

are every where found in great abundance; but the number of bridges required renders road-making very expensive. The roads forming by government, and the Highland counties conjointly, will cost, on an average, 250*l.* per mile; though their breadth be only fifteen feet. The roads in the mountainous districts, if roads they can be called, are very bad; but most of them are in progress of amelioration. The road from Contin to Lochcarron is considerably advanced.

Towns and Villages.—In the united counties of Ross and Cromarty there are three royal boroughs, all of them situated in the eastern district. These are Tain, on the southern side of the Frith of Dornoch; Dingwall, at the inland extremity of the Frith of Cromarty; and Fortrose, on the northern side of the Moray Frith. Of the villages, the most worthy of notice are Cromarty, Ullapool, Fairtoosh, and Lochalsh: the last has lately been constituted a burgh of barony. Fairtoosh is remarkable for the singular privilege it enjoyed for nearly a century, of exemption from excise, on condition of an annual payment of 400 marks Scots. This right was resumed by government in 1786, and the sum of 20,000*l.* was granted as a compensation to the proprietor. Before that period, Fairtoosh whiskey was proverbial for its purity and excellence; and even yet, the appellation of real Fairtoosh is used to denote the best samples of that favourite Highland beverage. Fairs, markets, and "tryfts" for cattle, are held at various places throughout the country; some of them established by custom, and others by acts of parliament.

Manufactures and Commerce.—The only manufacture which has been established in these counties is that of biscuit and cotton-bagging at Cromarty, with branches at Invergordon and Port-Mahomack. This is carried on to a considerable extent. The bagging made at these places, and at Inverness, obtains a decided preference, under the name of Inverness bagging, where it is principally sold. Many years ago, a flax manufactory was attempted to be established, but without success. With respect to commerce, it may be observed, that the chief exports are black cattle, sheep, and wool, and a considerable quantity of wheat and oats.

Antiquities.—Ross-shire contains a considerable number of remains of antiquity, which are not unworthy of notice. These consist chiefly of Druidical temples, and Pictish or Danish forts, called Duns, and of the castles of the ancient chieftains. In the parish of Kiltearn, in the eastern district, is a Druidical templ., consisting of a row of twelve large stones, so disposed as to form two conjoined ovals. The area of each oval is 13 feet long and 10 feet broad in the centre. At the western extremity of one of them is a stone, which rises eight feet above the surface of the ground; but the other stones do not exceed six feet in length. In the middle of the western oval is a flat stone, which was probably the altar; and at the distance of three paces from the eastern oval is a circular hollow, said to have been a well of considerable depth, but it is now filled up. These ovals occupy the summit of an eminence, round which are drawn three concentric circular ditches; and at the distance of half a mile to the westward is a cairn, 30 paces in diameter, containing in the centre a grave 3½ feet long, 18 inches broad, and 14 deep, lined by four flat stones, and covered by another. Cairns are also numerous on the adjoining hill. In the parish of Nigg, on the the same coast, stands a large obelisk, on one side of which are cut the figures of different animals, and on the other a cross. The former is supposed to be a much older work than the latter; and the tradition is, that the stone was erected in memory of a shipwreck, by which
three

three sons of one of the Danish monarchs are said to have lost their lives, and their bodies buried under the obelisk. The rock opposite, where the vessel struck, is from this circumstance still called the King's-Sons. Another obelisk, similar to the above, formerly stood in Nigg church-yard, but the base of it alone remains. Near Dunskeath, on the ledge of a rock over-hanging the Moray frith, are the remains of a castle, built in 1179, by William, surnamed the Lion, king of Scotland. In the parish of Kincardine is Craighentan, where the gallant marquis of Montrose fought his last battle. He swam to Kyle, and lay some time concealed in Allint; but being discovered and apprehended he was sent prisoner to Inverness. The ground where the battle took place received its present name from the event of that memorable day. Near the church, in the same parish, is an alley, walled in, and terminating in a large semicircle, appropriated to the military exercise and discipline, distinguished by the name of Weapon-shaving; and in the cemetery is a stone sculptured with an imperial crown, and a man on horse-back, in the act of darting a lance. Tradition reports it to be the upper part of a stone coffin, in which the remains of a prince of Loellin, who died of his wounds in the neighbourhood, were deposited. In the same neighbourhood are also several Druidical circles, and likewise some of the round buildings which were formerly mentioned under the denomination of Picts-houses. Near Avoch, the foundations still remain of a large old castle, or fortalice. To this ruin tradition gives the name of Douglas castle. It is about 350 feet long and 160 feet broad, divided into numerous apartments, which appear to have been constructed of coarse red quarry-stone and lime; and was defended on one side by a deep fosse, and on another by battions. Throughout every part of the eastern district are abundance of places where battles with the Danes and Norwegians, or between rival clans, are said to have been fought. Numbers of cairns point out the spots where the ashes of the dead have been deposited, though concerning most of them tradition is silent. In the parish of Eddertoun, however, on a plain to the west of the church, tradition says a great battle was fought against the Danes, one of whose princes, who fell in action, lies buried in the centre of a large circular barrow in the immediate vicinity. In the parish of Fearn are several Druidical temples; but the most interesting monuments of antiquity here are the abbey and castle of Lochlin. The abbey-church was long used for divine service, but is now in a state of ruin. The castle occupies the summit of a very lofty eminence, and is one of the most conspicuous objects in the country. It is built in the form of two squares, joined together at the corners. Another very ancient castle was situated at Cadboll, whence it derived its name. Few remains of it now exist, except the vaults under ground; but it deserves notice on account of a singular tradition concerning it, which is fully credited by the vulgar, *viz.* that though it was inhabited for many centuries, no person ever died in it; in short, that it possessed a magical charm against death, though not against disease, or the evils attendant on extreme old age. Hence many of the inhabitants, it is said, when they became weary of life, requested to be carried out of the castle, that they might obtain relief. The castle of Craighouse, in the parish of Kirk-Michael, stands close to the shore, inclosed on the land side by a ditch and high wall. All the apartments of that portion of the mansion now most entire are vaulted with stone. This castle was long the property of the family of Williamson, who emigrated to Germany; it afterwards became the occasional residence of the bishops of Ross. In this vicinity is a great number of ancient encampments, like-

wise various tumuli and cairns. In Killernan parish are two ancient structures, Killeoy and Redcastle, of considerable strength. The latter was anciently of some importance. It was annexed to the crown in 1455, and was constituted a borough of barony, and a free-port, with the right of holding weekly markets, and levying toll and anchorage dues. Rory Mackenzie, the proprietor of Redcastle in 1646, having joined the rebellious standard of the gallant marquis of Montrose, was taken prisoner near Balveny, in Morayshire, and suffered the death of a traitor. During his absence the castle was garrisoned by his sons and dependants, but was soon after stormed and taken by a party of royalists, who put the garrison to the sword and set fire to the buildings. In the mountainous peninsula of Kintail, on the west coast, stand the ruins of the castle of Donan, which was built by Alexander III. of Scotland, to resist the depredations of the Danes. Colin Fitzgerald, ancestor to the late earl of Seaforth, was made constable of the castle, for his bravery at the battle of Largs, fought in 1263. In 1715 it was taken from the king's forces by stratagem; but two years afterwards, having been attacked on the sea side, by a line of battle ship, it was demolished. In the front of a clergyman's house, in Kintail, stands Donan-Diarmed, or the fort of Diarmed. It is of a circular form, twenty feet in diameter, and of the same height. Diarmed's tomb is on the north-east side of the fort.

Such parts of Ross-shire as are included in the Hebrides, the reader will find noticed under their respective names, and also under the words WESTERN ISLANDS. Beauties of Scotland, vol. v. Lond. 8vo. 1808. A General View of the Agriculture, &c. of the Counties of Ross and Cromarty, by Sir George Stuart Mackenzie, bart. Lond. 8vo. 1810.

ROST, JOHN CHRISTOPHER, in *Biography*, a German poet, was born at Leipzig in the year 1717. He received a good education, and as he advanced in life he studied, with the utmost assiduity, jurisprudence, antiquities, and the belles lettres. His chief instructor was Ernesti, but he studied philosophy also under Hoffman, and attended the lectures of Gottsched, to whose praise he devoted the first fruits of his muse, though he afterwards wrote against him a satirical poem, which was published in 1743. This is said to be the best of his productions, and to abound with genuine and delicate wit. He attempted pastorals in the German language, which were printed at Berlin in 1742, but the morality of them is exceedingly lax, and vice is exhibited too frequently under the captivating form of innocence. A new edition of them appeared at Dresden in 1744, entitled "An Attempt at Pastoral Poetry, with other poetical Pieces," and a third was published in 1768. In 1746, Rost was appointed secretary and librarian to Count Bruhl, and died in 1765, in the 48th year of his age. His miscellaneous poems were published after his death, in 1769. Gen. Biog.

ROST, in *Metallurgy*, a term used by the miners at Chrennitz to express the ore of gold after it has been washed and powdered, and melted first with lime-stone, and afterwards burnt with charcoal alone. See LECH.

ROSTAD, in *Geography*, a town of Norway; 70 miles N. of Drontheim.

ROSTAK, a town of Arabia, in the province of Oman, the seat of a sovereign prince, at some distance from the sea; 70 miles W. of Mascat.

ROSTAK, a town of Persia, in the province of Laristan; 90 miles S. of Mar.

ROSTAL, a town of Germany, in the principality of Anspach; 7 miles N.N.W. of Schwabach.

ROSTAN,

ROSTAN, a town of Syria, in the pachalic of Damascus; 45 miles N.N.E. of Damascus.

ROSTAYN, a town of Bohemia, in the circle of Boleſlau; 4 miles N. of Aycha.

ROSTEN, in the *Materia Medica* of earlier ages, a name given to crab's eyes.

ROSTER, in *Military Language*, a plan, or table, by which the duty of officers, entire battalions, and squadrons, is regulated.

ROSTGAARD, FREDERICK, in *Biography*, a learned Danish writer, was born at Kraagerup, in Seland, in the year 1671. He was educated at Copenhagen, and in 1690 he undertook a tour through Europe; in the course of which he paid a visit to the most celebrated universities of Germany, Holland, England, France, and Italy. After his return in 1669, he was made private keeper of the records to his Danish majesty, and in 1702 was ennobled and appointed a counsellor of justice. In 1721 he became chief secretary in the Danish chancery, and after receiving a considerable pension, he was nominated in 1735 a counsellor of conference. He died in 1745, and bequeathed to the library of the university of Copenhagen a great many manuscripts and several printed books, consisting mostly of historical works, with a large fount of Arabic and Persian types. He was author of a great number of works, among which the following may be enumerated: "Deliciae Poetarum Danorum;" "A Danish Translation of Corneille's Cid;" "Projet d'une nouvelle Methodé pour dresser le Catalogue d'une Bibliothèque selon les Matières avec le Plan;" "Enchiridion studiosi, Arabicè cum Versione Latina, edit. ab Hadriano Relando." He collected, with great care, and at a considerable expence, in various parts of France and Italy, manuscripts of "Libanii Epistolæ," from which the edition of J. C. Wolfius of Hamburg was published. It was through the exertions of Rostgaard that the "Fragmentum Theotiscum Isidori Hispalensis" was discovered and published in the second volume of the Danish Bibliothéque. He was the author of many Latin and Danish poems, and was employed for several years on a Danish Lexicon, as well as in collecting rare Arabic and Greek manuscripts, and heraldic documents relating to the Danish nobility. Gen. Biog.

ROSTOCK, in *Geography*, a sea-port town of Germany, in the circle of Lower Saxony, and duchy of Mecklenburg, on a lake which communicates with the Baltic. It contains three churches and an university, jointly founded by the dukes and the town in the year 1419, and privileged by a bull of pope Martin V. afterwards confirmed by the emperor Ferdinand I. But in 1437, the town fell under the ban both of the emperor and pope, and the professors removed to Griefswalde, whence they returned again in 1443. In 1487, on account of a misunderstanding between the dukes and the town, the university was removed to Lubeck, but again restored in 1492. The place has thrice suffered from the pestilence, and at the commencement of the reformation was deserted by its professors and students till the year 1530, and in 1550 the emperor Ferdinand afforded it a new charter. In pursuance of a convention made, in 1563, between the dukes and the town, the former nominate and pay fifteen professors, and the town nine. It was also agreed that the dukes should annually contribute 3000 florins, and the town 500, towards the salaries of the professors. The magistracy consists of three burgher-masters, one syndic, twelve aldermen, one secretary, and a prothonotary. It possesses the right of coining copper, silver, and gold, and therefore has a mint. Both the civil and criminal jurisdiction are vested in the magistracy, with right of appeal to the two

supreme courts of justice, except in those cases where no appeal is allowed. The town enjoys other considerable privileges; nevertheless it is hereditarily subject to the dukes, in acknowledgment of which subjection it annually pays 55 rixdollars, as an original tribute, and also 600 florins, for the grant of an excise. The trade of this town is very considerable. In the year 1218 it was admitted into the Hanseatic confederacy; 25 miles N.E. of Weismar. N. lat. 54° 10'. E. long. 12° 12'.

ROSTOV, a town of Russia, in the government of Jaroslavl, situated near a lake, to which it gives name: the see of a bishop; 36 miles S. of Jaroslavl. N. lat. 57°. E. long. 39° 54'.

ROSTRA, in *Antiquity*, a part of the Roman forum, wherein orations, pleadings, funeral harangues, &c. were delivered.

The rostrum was a kind of chapel, taken out of the forum, and furnished with a suggestum, or eminence, called more particularly the rostra, where the orators stood to speak.

It was adorned, or, as Livy says, built, with the beaks of ships taken from the people of Antium, in a naval engagement; whence the name.

There were two kinds of rostra; *rostra vetera* and *rostra nova*. The latter was erected by Augustus, and decorated with the prows of vessels which he took at the battle of Actium. The first were those already described.

ROSTRALIS CORONA, *Rostrals Crown*. See CROWN.

ROSTRALIS Columna, *Rostrals Column*. See COLUMN.

ROSTRATA, in *Zoology*. See TOUCAN.

ROSTRENEN in *Geography*, a town of France, and principal place of a district, in the department of the North Coasts; 20 miles S. of Guingamp. N. lat. 48° 14'. W. long. 3° 15'.

ROSTREVOR, a post-town of the county of Down, Ireland, situate on the bay of Carlingford, and much frequented for sea-bathing. Mr. Wakefield calls it the Brighton of Ireland, and it has been much admired for its romantic scenery. It is a wooded bank, on a small arm of the sea, and has behind it the Mourne mountains. It is 57½ miles N. from Dublin, and 7½ from Newry.

ROSTRIFORMIS PROCESSUS, in *Anatomy*, the same as coracoides.

ROSTRUM literally denotes the beak or bill of a bird. This is a hard horny substance, consisting of an upper and under part, extending from the head, and answering to the mandibles in quadrupeds. Its edges are generally plain and sharp, like the edge of a knife, or cultrated; sometimes ferrated, or jagged, or pectinated, or denticulated; but always destitute of real teeth immersed in sockets. See *Anatomy of BIRDS*.

Hence the word is also figuratively applied to the beak, or fore-part, of the head of a ship.

The rostrum, or snout, in fishes, varies very much in figure, and serves as a considerable article of distinction. It is, 1. In some plagioplateous, or depressed, as in the pike, &c. 2. In some it is conic in shape, as in the oxyrinchus, &c. 3. In some it is extended into a long and sharp point, as in the common ones. And, 4. In others it is triangular, or nearly so, as in the rays. See FISH.

ROSTRUM is also used to signify an instrument, with which paper is ruled for musical compositions.

ROSTRUM, in *Chemistry*, signifies the nose, or beak, of the common alembic, which conveys the liquor distilled into its receiver.

ROSTRUM is also a sort of crooked scissars, which the surgeons,

surgeons, in some cases, make use of for the dilatation of wounds.

ROSTRUM Leporinum, in *Surgery*, the piece of flesh situated betwixt the margins of a hare-lip.

ROSTRUM Seminis, in *Botany*, the beak of the seed, is an elongation of the apex of a naked seed, originating either in the base of the style itself, remaining in a hardened state (see *DICHROMENA*); or it consists of an appendage to the whole fruit, composed of two naked seeds; as in *Scandix*. The same term applies to a similar elongation of certain seed-vessels; as in *Geranium* and its allies, whose beaks bear a strong analogy to those of *Scandix*; and in *Helleborus*, *Delphinium*, and abundance of other genera, where they originate from the indurated styles.

ROSWEIDE, **HERIBERT**, in *Biography*, a learned Dutch Jesuit, and writer in ecclesiastical antiquities, was born at Utrecht in the year 1569. He entered among the disciples of Loyola, at Doway in Flanders, when he was 20 years of age, and soon discovered the subjects of study peculiarly adapted to his genius, by spending the time which he was allowed to devote to exercise and recreation, in examining the libraries of the monasteries in that city, and rescuing the ancient manuscripts contained in them from dust and oblivion. Having completed his course of academical studies, he filled successively the chairs of philosophy and divinity, first at Doway and afterwards at Antwerp, with great reputation for several years. After this he devoted his time to the compilation and publication of his various works. He died in 1629, at the age of 60. He published, in 1607, "Fasti Sanctorum quorum Vitæ in Belgicis Bibliothecis Manuscriptæ asservantur," which he intended as a specimen of a larger work, and which was the prototype of the immense collection by Bollandus and others, under the title of *Acta Sanctorum*. He was author of many other works, among which is "An Account of the Hermits of Egypt and Palestine," "An Ecclesiastical History from the Time of Christ to Pope Urban VIII." in two vols. folio; and "The History of the Belgic Church."

ROSWALD, in *Geography*, a town of Moravia, in the circle of Prerau, insulated in Silesia; 6 miles N. of Jagendorf.

ROSWICK, a town of Sweden, in West Bothnia; 10 miles N. of Pitea.

ROSYCRUSIANS, **ROSIERUCIANS**, *Rosacrucians*, or *Brothers of the Rosy-cross*, a name assumed by a sect or cabal of hermetical philosophers, or of *Theosophists*; who arose, as it has been said, or at least became first taken notice of, in Germany, in the beginning of the 14th century.

They bound themselves together by a solemn secret, which they all swore inviolably to preserve; and obliged themselves, at their admission into the order, to a strict observance of certain established rules.

They pretended to know all sciences, and chiefly medicine; of which they published themselves the restorers. They pretended to be masters of abundance of important secrets; and, among others, that of the philosopher's stone; all which they have affirmed to have received by tradition from the ancient Egyptians, Chaldeans, the Magi, and Gymnosophists.

Their chief was a German gentleman, called Christian Rosencruz, educated in a monastery, where he learnt the languages. About the close of the 14th century he went to the Holy Land, and visited the holy sepulchre; and falling sick at Damascus, he consulted the Arabs, and other eastern philosophers, by whom he was supposed to be initiated into this wonderful art. At his return into Germany, he formed

a society, to whom he communicated the secrets he had brought with him out of the East, under an inviolable oath of secrecy, and finally died in 1484.

This society remained concealed till the beginning of the 17th century, when two books were published; the one entitled "Fama Fraternitatis laudabilis Ordinis Rosæcrucis," The Report of the laudable Fraternity of Rosicrucians; the other, "Confessio Fraternitatis," The Confession of the Fraternity. In these works the world was informed, that the fraternity was enabled, by divine revelation, to explain the most important secrets both of nature and grace; that they were appointed to correct the errors of the learned world, particularly in philosophy and medicine; that they were possessed of the philosopher's stone, and understood both the art of transmuting metals and of prolonging human life; and in fine, that by their means the golden age would return. As soon as these grand secrets were divulged, the whole tribe of the Paracelsists, Theosophists, and chemists, flocked to the Rosicrucian standard, and every new and unheard-of mystery was referred to this fraternity. Various were the opinions that were formed of this society; but though its laws and statutes had appeared, no one could tell where the society itself was to be found, or who really belonged to it. It was imagined by some sagacious observers, that a certain important meaning was concealed under the story of the Rosicrucian fraternity, though they were wholly unable to say what it was. One conjectured that some chemical mystery lay hid behind the allegorical tale; another supposed that it foretold some great ecclesiastical revolution. At last Michael Brele, in the year 1620, had the courage publicly to declare, that he certainly knew the whole story to have been the contrivance of some ingenious persons, who chose to amuse themselves by imposing upon the public credulity. This declaration raised a suspicion against the whole story; and as no one undertook to contradict it, this wonderful society daily vanished, and the rumours which had been spread concerning it ceased. The whole was probably a contrivance to ridicule the pretenders to secret wisdom and wonderful power, particularly the chemists, who boasted that they possessed the philosopher's stone. It has been conjectured, says Brucker, and the satirical turn of his writings, and several particular passages in his works, favour the conjecture, that this farce was invented and performed, in part at least, by John Valentine Andrea, a divine of Wartenburg.

We shall here subjoin some further particulars concerning the Rosicrucians.

They have been distinguished by several names, accommodated to the several branches of their doctrine.

Because they pretend to protract the period of human life, by means of certain nostrums, and even to restore youth, they were called *immortales*.

As they pretended to know all things, they have been called *illuminati*: and because they have made no appearance for several years, but have kept altogether incognito, they have been called the *invisible brothers*.

Their society is frequently signed by the letters F. R. C., which some among them interpret *fratres rois cœli*; it being pretended, that the matter of the philosopher's stone is dew concocted, exalted, &c.

Some, who are no friends to free-masonry, make the present flourishing society of free-masons a branch of Rosicrucians; or rather the Rosicrucians themselves, under a new name or relation; *viz.* as retainers to building. And it is certain, there are some free-masons who have all the characters of Rosicrucians; but how the era and original of masonry, as traced by Mr. Anderson, and that of Rosicrucianism,

crucianism, here fixed from Naudæus, who has written expressly on the subject, consist, we leave others to judge.

Notwithstanding the pretended antiquity of the Rosicrucians, it is probable that the alchemists, Paracelsists, or *fire philosophers*, who spread themselves through almost all Europe, about the close of the 16th century, assumed, about this period, the obscure and ambiguous title of Rosicrucian brethren, which commanded, at first, some degree of respect, as it seemed to be borrowed from the arms of Luther, which were a *cross* placed upon a *rose*.

But the denomination evidently appears to be derived from the science of chemistry. It is not compounded, says Mosheim, as many imagine, of the two words *rosa* and *crux*, which signify *rose* and *cross*, but of the latter of these words, and the Latin word *ros*, which signifies *dew*. Of all natural bodies, dew was esteemed the most powerful dissolvent of gold; and the *cross*, in the chemical language, is equivalent to *light*, because the figure of a cross + exhibits, at the same time, the three letters of which the word *lux*, or *light*, is compounded. Now *lux* is called, by this sect, the seed or menstruum of the red dragon, or, in other words, that gross and corporeal light, which, when properly digested and modified, produces gold. Hence it follows, if this etymology be admitted, that a Rosicrucian philosopher is one, who, by the intervention and assistance of the dew, seeks for light, or, in other words, the substance called the philosopher's stone.

The true meaning and energy of this denomination did not escape the penetration and sagacity of Gassendi, as appears by his *Examen Philosophiæ Fluddanæ*, sect. 15. tom. iii. p. 261. And it was more fully explained by Renaudot, in his *Conferences Publiques*, tom. iv. p. 87.

At the head of these fanatics were Robert Fludd, an English physician, Jacob Behmen, and Michael Mayer. The common principles, which serve as a kind of centre of union to the Rosicrucian society, are the following. They all maintain that the dissolution of bodies, by the power of fire, is the only way by which men can arrive at true wisdom, and come to discern the first principles of things. They all acknowledge a certain analogy and harmony between the powers of nature and the doctrines of religion, and believe that the Deity governs the kingdom of grace by the same laws with which he rules the kingdom of nature; and hence they are led to use chemical denominations to express the truths of religion. They all hold, that there is a sort of divine energy, or soul, diffused through the frame of the universe, which some call the *archeus*, others the *universal spirit*, and which others mention under different appellations. They all talk in the most superstitious manner of what they call the signature of things, of the power of the stars over all corporeal beings, and their particular influence upon the human race, of the efficacy of magic, and the various ranks and orders of demons. In fine, they all agree in throwing out the most crude incomprehensible notions and ideas, in the most obscure, quaint, and unusual expressions. Brucker's *Hist. Philos.* by Enfield, vol. ii. *Moth. Eccl. Hist.* vol. iv. Eng. ed. 8vo. See BEHMISTS and THEOSOPHISTS.

ROT, in *Rural Economy*, a sort of putrid decay, taking place gradually in different substances, either from the effects of moisture or other causes. Much mischief is frequently done in this way to different kinds of materials of the farm sort.

This sort of decay in materials, whether of the manure or other kinds, is greatly promoted by their being kept in a continued moist condition, by the atmospheric air being freely admitted to them; and where they are of a strawy, littery, or light nature, by their being thrown together in

rather an open manner. The contact of the earth or mould also promotes this kind of rot in a very great degree. There is likewise a great variety of other causes, which have a tendency to bring on and expedite the decay of substances both of the hard and less firm kinds. See PUTREFACTION.

Rot, among sheep-farmers, a disease incident to sheep and other animals, in which both the liver and lungs are affected, and there is often a dropical tendency. It is mostly connected with moisture or moist situations; but its causes are far from being perfectly investigated. Dr. Harrison of Lincolnshire has, however, lately done much in this way, and drawn many useful and scientific conclusions. The disease is readily known to experienced shepherds by a careful examination of the eye, which is done by placing the sheep between his thighs, and holding the head with both hands. He then proceeds to raise the upper, and depress the under eye-lid, by which means the blood-vessels of the tunica albuginea, or white, are brought into view. When they are red, and in great numbers, the sheep is supposed to be in good health. The caruncula lacrymalis, or haw and inner surface of the eye-lids, should be as red as the vessels on the eye-ball. If they are pale, and the veins are in small quantities, and faint-coloured, or livid, the sheep is in a debilitated state, or afflicted with the rot. And in all cases where the blood-vessels have entirely disappeared, the nut-ton is bad. By frequently examining the eyes in dangerous seasons, shepherds may always discover the rot before the sheep begin to shrink, and, consequently, in time to prevent any material injury to their profits.

The above intelligent writer traces the nature and effects of the disease in the following manner: when in warm, sultry, and rainy weather, sheep that are grazing on low and moist lands feed rapidly, and some of them die suddenly, there is reason to fear that they have contracted the rot. This suspicion will be further increased, if in a few weeks afterwards the sheep begin to shrink, and become flaccid in their loins. By pressure about the hips at this time, a crackling is sometimes perceptible. Now, or soon afterwards, the countenance looks pale, and upon parting the fleece, the skin is found to have exchanged its vermilion tint for a pale red; and the wool is easily separated from the pelt. As the disorder advances, the skin becomes dappled with yellow, or black spots. About this time the eyes lose their lustre, and become white and pearly, from the red vessels of the tunica adnata, and eye-lids, being contracted or entirely obliterated. To this succeed debility and emaciation, which increase continually till the sheep die; or else ascites, and perhaps general dropsy supervene, before the fatal termination. These symptoms are rendered more severe by an obstinate purging, which comes on at an uncertain period of the disorder. In the progress of the complaint, sheep become what the graziers call *choked*, that is, affected with a swelling under the chin, which proceeds from a fluid contained in the cellular membrane, under the throat. And he adds, that in five or six days after contracting the rot, the thin edge of the small lobe of the liver becomes of a transparent white, or blueish colour, and this spreads along the upper and lower sides, according to the severity of the complaint. Sometimes it does not extend more than an inch from the margin. In severe cases, the whole peritoneum investing the liver is diseased; and then it commonly assumes an opaque colour, interspersed with dark red lines or patches. The upper part of the liver is sometimes speckled like the body of a toad, to which it is said to bear a striking resemblance; round the ductus communis cholecus and hepatic vessels, a jelly-like matter is deposited, which

which varies according to the severity of the attack, from a table-spoonful, or less, to five or six times that quantity. Upon boiling, the liver loses its firmness, and separates into small pieces in the water, or remains soft and flaccid. And it is observed, that graziers and butchers having remarked that sheep are much disposed to feed during the first three or four weeks after being tainted, avail themselves of this circumstance very commonly to increase their profits. When the first stage is over, flukes begin to appear in the pori biliarii, the ductus communis choleodocis, and in the gall-bladder. At first the number of these creatures is small; but as the disease advances they increase, and before death, are often very numerous. In the last part of the complaint, they are sometimes to be found in the stomach as well as in the intestines and liver. This, like the visceral disorders of the human body, may terminate in resolution, effusion, suppuration, or schirrus. 1st. The complaint is said to terminate in resolution, when the inflammatory action goes off, without destroying the state and texture of the parts. However, he is strongly inclined to believe, that every considerable inflammation in the human body, and in other animals, although it ends in resolution, leaves behind it some remains, which may be discovered by an experienced anatomist. When the vessels are thrown into inflammatory action for a few days only, effusion commonly takes place, and the coats become thicker, and assume a buff-like colour. These changes in the sanguinary system often continue through life, and lay the foundation of many chronic and incurable disorders. Sheep that recover from the rot exhibit very different appearances after death, according to the severity of the attack; but the taint is seldom or never entirely removed. The liver of an old ewe, that lately died fat, and contained fourteen pounds of suet in her body, had the following appearances: the back part of the small lobe was dappled with whitish spots; the coats of the ductus communis and pori biliarii were considerably thickened, and more solid than usual. In colour they resembled the human aorta in old people, and were full of flukes: in other respects the liver appeared to be sound and natural. The butcher asserted that the variegated appearance and alteration in the ducts were occasioned by a slight taint of long standing, which had not been considerable enough to disorder the economy, or impair the health of the animal sufficiently to prevent its feeding.

2dly. That when sheep die suddenly in the first stage of the disorder, an effusion of serum, or of wheyish-coloured fluid, may be commonly discovered in the cavity of the abdomen, and then the peritoneum surrounding the liver is generally covered with a membrane or coat of coagulable lymph. This form of the rot has been frequently confounded with the resp or red water, though it differs from the latter disorder in the colour of the effused liquid, in being much less exposed to putrefaction, and in several other particulars.

3dly. And that abscesses in the liver exhibit another termination of this malady. They are seldom considerable enough to kill immediately; but, in consequence of the absorption of purulent matter from them, the sheep frequently waste away, and die hectic or dropical. When the collections are small, sheep will recover sufficiently to bear lambs; for three or four seasons, and afterwards become tolerable mutton. 4thly. That the most common termination is in schirri, or what the shepherds call knots in the liver. The whole substance of this important viscus has been found so full of small roundish lumps, or schirrous bodies, that it was difficult to find any sound part in it. The first attack is unfortunately so very insidious, that the disorder is scarcely

observable before the animal begins to waste and lose flesh. In this advanced state it is said to labour under the rot or pourriture, from overlooking the commencement of the disorder. And hydatids are observed to effect schirrous and purulent livers more frequently than others. When livers are much diseased, the butchers carefully conceal them from the public eye. To him it is always matter of surprize to find the mutton saleable in these severe cases. It shews, in an extraordinary manner, the accommodating power of living matter, which is able to maintain life, and increase corpulence, under such unfavourable circumstances. Shepherds and breeders, who make it a general rule to kill every sheep that becomes indisposed, from an opinion that very few of them ever recover from any illness, would do well to examine the livers and other viscera of slaughtered sheep. By such a practice they would soon be convinced that sheep are able to endure a great deal.

But in respect to the causes of the disease, it has been imputed, 1st, to a vitiated dew; 2dly, to a crust, which adheres to grass after wet weather, or the overflowing of running water; 3dly, to the luxuriant and quick growth of plants, in hot, moist seasons; 4thly, to grazing certain herbs; 5thly, to fasciolar hepaticæ, or their ova, being introduced into the stomachs of animals, by feeding on swampy and low grounds in moist weather: 6thly, it has been called the *sheep-pox* by professor Vibourg, of the veterinary college at Copenhagen; but this is not properly the cause of the rot. And, 7thly, it is ascribed, by Daubenton, to poor diet, and drinking too much water. These different causes are objected to, and shewn not well founded by the first writer, who thinks that, 8thly, it seems to be occasioned by poisonous effluvia, which, under certain circumstances, are emitted from marshy soils, in support of which it is stated that the following facts afford strong proofs.

His residence consists of high and low lands, of a loamy and tenacious nature. While a brook which runs through the farm remains overflowed, and the water continues upon the adjoining flat grounds, his sheep never suffer any inconvenience, though they are frequently obliged to wade for their provisions. As soon as the flood is subsided, the sheep can at any time be tainted in a quarter of an hour, while the land retains its moisture, and the weather is hot and sultry. The butchers are so well acquainted with the importance of this fact, that when his friend has disposed of any fat sheep, they are usually turned upon this rotten ground to make them thrive faster. But by judicious management he has laid the greatest part of his farm completely dry, and is now little troubled with the rot, unless when he wishes to give it to some particular animals. His neighbours, who have been less provident, are still severe sufferers by it; nor are their misfortunes confined to sheep alone. Pigs, cows, asses, horses, poultry, hares and rabbits, become rotten in this lordship, and have flukes in their livers. Many years since, his grandfather removed ninety sheep from a considerable distance to his own residence. On coming near to a bridge, which is thrown over the Barling's river, one of the drove fell into a ditch, and fractured its fore-leg. The shepherd immediately took it in his arms to a neighbouring house, and replaced the limb. During this time, which did not occupy more than one hour, the remainder were left to graze in the ditches and lanes. The flock were then driven home, and in a month afterwards, the other sheep joined its companions. The shepherd soon discovered that all had contracted the rot except the lame sheep; and as they were never separated upon any other occasion, it is reasonable to conclude that the disorder was acquired by feeding in the

road and ditch bottoms. And he adds, that a Lincolnshire farmer purchased some turnips in Nottinghamshire, upon which he intended to winter a flock of sheep. The first division, consisting of about forty, were detained one night at a village near to the place formerly alluded to, by the overflowing of the Barling's Ean, and were put upon a piece of flat land which leads to the river. The water had not returned to its former channel more than a day or two. Every one of the forty sheep became rotten; whereas the other division, which stopped no where by the way, escaped the disorder, and remained well. Sheep were formerly admitted into some adjoining pastures, in travelling to and from the neighbouring fairs and markets; but so many of them contracted the rot, that, for some time past, the graziers in this county will not suffer their flocks to stop for a moment near the village. He has repeatedly examined the suspected ditches and pastures, but never observed either slukes, or any of the plants, to which the rot has been attributed: though he must candidly acknowledge that he ought to have sought for them with more care and attention. These ditches communicate with a rivulet, which frequently overflows its banks, and the inclosures are then deluged with water. The soil consists chiefly of loam or clay, and the surface is so flat and level on both sides of the river, that for want of proper descent, the water is a long time detained upon the grounds. He is credibly informed, that in this place the rot affects swine, hares, and rabbits, as well as sheep.

It is further stated, that he has likewise been informed by Mr. David Wright, that a few years since, as a drove of sheep were passing through a long lane in the parish of Irby, one of them, being weary, fell down in the middle of the road. The others were permitted to range at large, till their companion was able to travel. They were then driven all together into a pasture, and it was soon discovered that only the *tired* sheep had escaped the rot. As the flock had never been separated upon any occasion, we are entitled to conclude that the disorder was contracted while the tired animal remained upon the road. From these and other cases, the writer thinks himself justified in ascribing the rot in sheep, and other animals, to *paludal effluvia*; but in regard to the nature and constitution of which he acknowledges it is very difficult to form any rational opinion, as they have hitherto eluded the most subtle and delicate inquiries.

In respect to the prevention of the disorder, he suggests, that where necessity requires the pasturage of moist grounds in summer or autumn, the shepherd ought carefully to remove his flock into a dry situation before the evening, and provide them with corn, and good hay, or green food. He says that a considerable farmer of Bohemia kept his sheep found in the wet and fatal year of 1769, by feeding them every night, when turned under a shed, or into stables, with hatched straw; and by eating it greedily they were all saved. By this judicious practice, the sheep were removed to sleep in better air, as well as preserved in a more vigorous state of body. Sir John Pringle informs us, that persons have maintained themselves in good health, during sickly seasons, by inhabiting the upper stories of their houses; and he has reason to believe, that by merely confining sheep on high grounds through the night, they have escaped the rot. He adds, that after the dew is exhaled by the sun's heat, sheep may be suffered to range in moist and swampy places, with less danger, because the miasmata, which are formed in the night, and remain entangled among the grass, or float in the lower part of the atmosphere, are chiefly dissipated with the dew. Therefore, unless they be very copiously produced in the day time, or are unusually virulent, they

will not be sufficiently concentrated to do much injury to healthy sheep. While at rest and asleep, the operations of the system are more feebly performed, and then sheep are peculiarly exposed to diseased actions. By conforming to these regulations, he has known one flock escape entirely, while others have suffered materially in the same open field.

And it is confidently asserted, that decoctions of bitter herbs, with salt, have frequently preserved sheep from the rot. Salt is supposed to constitute a part of Fleet's celebrated nostrum; and we know that bitters are deservedly recommended to prevent intermittents, the dysentery, and other disorders, which originate from exhalations. In Oxfordshire, Dr. Lower has frequently known six or seven spoonsful of strong brine and stale urine, with foot steeped in it, to be given with great success. This is done at spring and the fall of the year, when the dew is counted most dangerous. This course of physic is continued eight or ten days, or till the sheep eat their meat heartily; and if they were taken in time, there seldom died any in a whole flock. For the same purpose, Ellis recommends the following medicine in his "Practical Husbandry." Take a peck or more of malt, and mash it, as though you would brew it into ale or beer, and make eleven or twelve gallons of liquor; then boil in it a quantity of shepherd's purse, comfrey, sage, plantain, penny-royal, wormwood, and blood-wort: add yeast, and afterwards salt the mixture; then turn the liquor into a vessel. After April comes in, give seven or eight spoonsful to every sheep, once in the week, if the weather be wet, and if dry not so often.

Some have supposed that there are various objections to the above notions concerning the nature and causes of the rot in sheep; but especially that of its not being met with in the sheep of some other districts where *marsh miasmata*, and the diseases which depend upon it, greatly prevail. It has, indeed, been stated in the view of eliciting the truth of the matter, by Dr. George Pearson, that there is an apparent difficulty or objection to the above writer's conclusion—that the rot in these animals is occasioned by the same morbid agent which occasions intermittent and remittent fevers—in the circumstance that in some of the marshes of the county of Kent, where intermittent fevers affect a great proportion of the inhabitants; and even persons residing in the neighbourhood, although living on dry chalky lands, where such diseases never shew themselves, if at some distance from the low grounds, unless in consequence of importation; and in Chitney marsh, on the river Medway, near the isle of Sheppey, one of the most prolific situations for agues to be found in the kingdom; and which is equally famous for its pasturage, by which very great numbers of sheep are fed and kept; where the fallow and indeed cadaverous countenances of the inhabitants, shewed that most of them were ill, or were recovering from agues; on inquiring into the health of the sheep, besides the evidence of the fine healthy condition of the animals, it was found, on the authority of a shepherd who had lived thirty-six years in the marsh, that he had only seen the disorder once, and that was in the first year of his residence there; nor is the rot at all common in any part of the county of Kent. The Leicester breed of sheep, he asserted, were subject to it, but not the sheep bred in the marsh; nor were these animals subject to any other disease more frequently than in other situations in general, or particularly in the uplands. On these grounds, the doctor thinks, it would appear that one kind of miasmata of marshes which produce agues, do not in all situations also produce the rot. He does not, however, conceive it logically just to conclude, from the instance which has been given,

given, that miasmata paludum of a different species may not occasion the rot, and also agues. It is possible also, he supposes, that some concomitant agents or circumstances may render the same miasmata productive of one of the diseases in certain situations, but not of the other disorder.

The same circumstances occur in other situations, as there is a prevalence of miasmata in the Romney Marsh, another great sheep district, which frequently produces intermittent and remittent fevers; while the rot is scarcely ever known to happen in it. And in Essex there are agues in plenty, in many parts, without the rot in the sheep of them being at all known.

Some of these remarks and directions deserve the notice of the grazing farmer, as by proper attention to them much mischief may often be prevented. But there are some who suppose that most dependence in the cure of this affection is to be placed upon the removal of sheep into dry situations, keeping them warm and sheltered, and giving them dry food in the yard. In the Report on Agriculture for Lincolnshire, some circumstances are given that may direct the farmer on this point. It is stated, that in rotting years, the sheep that feed on the salt marshes over which the spring-tides come, sell very high in confidence that they are safe. And that a shepherd, who when young was shepherd's boy to an old man who lived at Netlam, a place noted for the rot, says he is persuaded that sheep only take the rot in a morning before the dew is off, as by keeping them up till the dew is gone they have been preserved from the disease, while others, where this precaution has been neglected, have become disordered.

Others think that the best and surest remedy, in these cases, is that of combining plenty of dry food with the free use of sea-salt, and at the same time removing the animals to the sound, rich, dry, pasture lands. The rot is never known to be caught on the South Downs of Sussex. When the sheep suffer in this way, the disease is always got while they are keeping in the weald, or other low lands. Such marshes as are occasionally overflowed by salt-water, are never known to rot sheep, but are most admirable for keeping them sound and healthy; and should any thing be capable of curing the rot, it is the sheep feeding on such land. Some have observed, that if, after a frost, even when very early, sheep be turned into such meadows and brooks as are at other times particularly liable to rot them, they will not, under this circumstance, suffer at all; as it is supposed the animalcules which the insects deposit in the summer among the herbage, are destroyed by the frost. The flounders found in the livers of the animals, are believed to be taken up with their food. It is more probable, however, that it is only the very minute ova of such insects which are taken into the stomachs of such sheep. The autumnal months, when there is no frost, are the most disposed to bring on the rot in the above district; but after one single night of hard frost, the danger is over for that year.

Rotten sheep have, in a great many instances, been cured by feeding them on the herbage growing on a thin soil on lime-stone rock. Hundreds have been known to have become sound on lime-stone land; their livers being completely healed, and the sheep healthy in every respect.

In the original Agricultural Report of the county of Stafford, it is suggested, that the rot in sheep may be removed by the use of medicine. The disease is conceived as perhaps rather similar in its nature to the dropsy, as there is a preternatural abundance of water. The writer remarks, that of six rotten sheep which he had about six years before the time of writing, he succeeded in curing five of them, but the sixth died full of water. One of the five which

were cured brought him a lamb the following year, which, with its mother, continued healthy, and became fat on grass; the lamb was sold in the summer, and the ewe in the beginning of winter, to a butcher. The other four also fattened, but in less time, on grass alone, and were parted with in the like manner. On April the 25th, in the year 1802, he also drenched two rotten ewes, one of them in the last stage of the disease; they both became sound, acquired fat, and were sold, with many others, in October, to the butcher, undistinguished from the rest. Since that time he has repeatedly tried the same remedy; and on the whole number of cases, has not lost more than one in six or seven.

His method of performing the cure is this: the rotten sheep is to be fasted one night, then one table spoonful of the spirits of turpentine is to be taken, and mixed with two of the same spoonfuls of soft cold water; which is to be given to each sheep for one dose. The sheep is then to be kept on dry food for three or four days; at the end of which time, the same dose of the medicine is again to be repeated, and the sheep continued on dry food for three days longer; at the conclusion of which period such sheep may be permitted to join the flock. When affected with a considerable degree of looseness, sheep have often been cured in this manner with great facility.

In short, it may be concluded, in regard to the cure of this disease, which seems to be caused by a general debility or weakness of the whole system, accompanied with a local affection of the same nature in the liver, that all such foods and remedies as are of a dry nourishing quality, and which excite and strengthen the constitution, will constantly be found of great utility, if not wholly capable of affording a perfect cure of the disease.

The following receipt was presented to the Royal Society, by Mr. Boyle, and is preserved in their register, vol. ii. p. 303. Some time before Allhollantide, the sheep is to be blooded under the eye, and, if necessary, again in the spring; and, in October, his gums may be rubbed at three or four different times with Spanish salt. But the principal remedy consists in this: that about Allhollantide, or somewhat sooner, you take a small handful of the fore-mentioned salt, and making the sheep hold up his head, compel him to swallow it, and keep him from drinking any thing for about an hour after.

ROT, *Dry*, in *Rural Economy*, a highly destructive vegetable disease, affecting the timber in the foundations, and other parts of buildings, in particular soils and situations. It affects the wood, or ligneous parts, in such a manner as to leave it connected by nothing but the small hard fibrous portions, which give it a curious tremulous appearance, but all of which, when touched by the hand in the more advanced stages of the disease, readily moulder into a brownish snuff-like dust. It is attended with a peculiar earthy smell, similar to that which issues from fresh dug up wood, which has lain some time in the ground in contact with decaying animal matter. It is very materially different from that natural sort of decay which takes place in wood from the presence of wetness. This has been supposed to originate from very different causes, such as the use of wood in too green a state, excessive dampness in the foundations of the buildings which are affected with it, the want of a free circulation of air in such situations, and more lately to be the effect of a plant of the fungus tribe, which has leaves as in the mistle-toe, &c. the boletus lachrymans. And on the former suppositions it has been stated to the Society for the Encouragement of Arts, &c. by Mr. Bramley of Leeds, in the thirty-first volume of their Transactions, that to bring the matter to the test by experiments, would require the observations of a

long period, and in selected situations. And that wood used for the general purposes of man is cut down at different periods; and although it may be felled at the proper season, or when most free from sap or moisture, it is not always to be effected. Nay, even admitting it to have been cut down in the most favourable situation, it still abounds with such an extra proportion of moisture, as to require a regular exposure to the air prior to its being applied to use, if we wish to guard against that shrinking which always takes place where this precaution has not been taken. And although the fir kind contains less of this watery portion, yet it assuredly possesses a considerable share; and it is in this species, he apprehends, that the evil called the dry rot most generally occurs, as from the facility of working the same it is most generally applied in buildings. But supposing it to be fir, or any other species, wood felled when abounding with any extra proportion of sap, and applied to use without the proper seasoning or exposure to a free current of air, until such extra moisture has had time to exhale, is most liable to the disease in question; and the cure, or principal prevention against it, would be the precaution of felling all wood only at the proper season, or when the sap is not in circulation. The next mode of prevention would be to use such wood only as has been for a considerable period exposed to the influence of a free current of air, or, where convenience will admit, to that of air heated to a moderate degree; such air extracting with greater facility the enclosed moisture, and in a more certain ratio than the irregularity of our atmosphere will allow, under other circumstances.

And it is suggested, that in all rapidly-improving countries, this evil is likely to be an increasing one, as the current demand for wood generally exceeds the supplies laid by in store, so as to be applied to use in regular succession, after being properly seasoned. And that another cause that affects all wood most materially, when not fully dried, is the application of paint, the nature of which prevents all exhalation, and confines the enclosed moisture, till it occasions a fermentation through the whole fibrous system of the wood, and brings on a premature state of decomposition, or the dry rot. It is likewise supposed that a similar evil may be induced, in consequence of any newly finished building having all the doors and windows shut up, and that for some length of time, particularly in moist weather. The wood, even though unpainted, is thus frequently placed in our atmosphere more charged with vapour than in its own internal contents, and it is consequently in an imbibing instead of an exhaling state, and tending to decay. Wood placed in dampish situations, and the ends of timbers near to moist walls, suffer from similar causes, but what particularly attracted his observation to the circumstances was this, that both oak and fir posts were brought into this premature state of decay, from their having been painted prior to the due evaporation of their moisture; and then extending the observation, and tracing the history of other wood affected in a similar manner, he is convinced that the evil frequently thus originates, and its prevention would be in using timber previously well dried and seasoned for such purposes.

And it is added, that since these observations were made, having been busily engaged in draining from 4000 to 5000 acres of ground, further ideas on the subject of the dry rot have occurred to him from the work he has been engaged in. Where houses are troubled with damp walls, near to the earth's surface, it is generally, if not universally, occasioned by the percolation of water from the higher adjoining ground, which, thus intercepted in its current, attempts to follow the general hydrostatic law, of elevating itself, by

the syphon line, to a height equal to that from whence it has its origin. Thus in houses differently situated, we see the damp arising to varying degrees of height on the walls, and those are probably corresponding to the height at which the moisture circulates in the adjoining ground. At its first entrance to the building, and whilst the moisture is in small quantity, the excavated part of the foundation wall, he thinks, may absorb, and gradually quit such proportion: but the excess, as is generally the case in moist weather, exceeding that power, the foundation stones are then saturated in a more rapid proportion than the adjoining rarefied internal atmosphere can evaporate: the watery particles then creep up, in degrees proportionate to the ascent from which they originally descended, excepting when prevented, or driven off by the superior heat of the adjoining rooms, when, in addition to the disagreeable damp they cause, they frequently occasion considerable damage to the pictures, furniture, &c. Drains laid out athwart the ascending ground, with a very slight descent or fall, and made of the depth of one yard for each yard of ascent, and from the foundation until equal the height that such damp ever rises, would, there is little doubt, completely secure the house and furniture from the inconveniences hitherto sustained, and would generally prove an effectual prevention to moist cases of the dry rot, where it originates in extreme moisture. He is of opinion that the fungus which pervades decaying wood is not the first cause, but a dependent on the peculiar state to which such wood has been reduced by prior causes. The diffused seeds finding a proper bed, or nidus, like to the mushroom, toad-stool, &c. fix their abode, and pervade the whole substance, thus accelerating the general law of Providence, which tends to make all matter reproductive.

Upon these grounds cellars, or such other places, should be drained in the manner he has mentioned, by taking off the percolating water prior to its gaining admission to or contact with the walls: and it is probable that, in moist cases, a single drain will have complete effect; it would assuredly, he thinks, do so, if it was not for the variation of the earth's internal strata, which are not easily discernible. And that if attention to this rule was paid prior to the building any new streets in towns, it would prove essentially useful in preventing such mischief.

And it has also been suggested to the above society, that mortar made of lime from burnt chalk is much more destructive to timber than stone-lime, or that burnt from lime-stone. Chalk-lime attracts moisture; and communicating it to any timber which it touches, occasions its decay. And further, likewise, that sea-sand is prejudicial, if made into mortar, from a similar quality of attracting moisture from the atmosphere: this, it is supposed, may in some degree be corrected by washing the sand well in fresh water, where good sand cannot be procured. But that good mortar, where any is required to be in contact with timber, may be made from a mixture of stone-lime fresh burnt, and river-sand, to which a very small quantity of common brown, or yellow iron ochre should be added, and well incorporated therewith in the operation of making it up. See QUICKLIME.

And it has been suggested by Mr. Johnson of Ipswich, in the same volume of the Transactions of the above society, that some time between 1771 and 1773, he went, at the request of a friend, to the chapel at the Lock hospital, through curiosity, to examine a pew there that had frequently been repaired for damages by the dry rot. And that after a close investigation, he found it was the operation of a plant, whose leaf resembled that of the vine. Wherever it had touched, the effect of its poisonous quality got through the wood to the paint, which he has seen a mere skin. He proposed to

ROT.

cover the floor with bricks, laid in mortar, which was accordingly done. He called twice since, the last time about seven years ago, and has reason to think that it never appeared again. That the next opportunity of examining it carefully was at Mark-hall, in Essex, the seat of Mr. Montague Burgoyne. In a parlour there were three pillars of about ten inches in diameter, the outwood of which was between two and three inches thick. Two of them were eaten through in less than seven years, from the bases, about two feet upward, within the hollow, and were as rotten as if it had been the effect of a hundred years standing. The gardener of this gentleman was a botanist; and found the plant where he directed him to search for it, and said it was the *boletus lachrymans*. And, he adds, that some authors call it a parasitical plant; and it is sometimes to be found with the willow and fallow tribe; but this is not to the purpose. Till within a few months he has never been without some leaves of the plant. For many years they appear exhausted and dead, and soon crumble into dust; but he suspects that fresh wood attracts a fresh growth from the root.

At another time, he saw it in a house at Whitehall, built by Sir John Vanbrugh, whose nephew then lived in it. The house is, he thinks, only two stories high; the plant had ascended to the upper story, committing devastation on the wainscot all the way. It will destroy half-inch deal wainscotting in a year. He has also had it twice in houses he inhabited, one in Suffolk, and the other in Gloucestershire. He bore with the first; in the other case he undertook to stop it, and did it effectually.

It is supposed, that the cause is from the floor being laid on the earth, which has been, where he has observed it, of a gravelly or sandy loam nature. The moisture from a water-course at hand, or a north aspect, where the outer wall stands in a garden-bed, so that the rain percolates, are great encouragers; it requires moisture, he suspects. But it never rises in the middle of the floor; because, if the seed were there, it could not germinate for want of air; but it is easy to suppose that after the floor is shrunk, an air may be created between that and the vacancy between the wainscot and the outer wall, sufficient for the purposes of vegetation. He says, he saw an instance last summer in the house of a friend, a student in botany. He was surprised when he told him it was a visit from a plant; but so it proved, and always is, and ever was so; nor does it originate from any other cause.

With the view of removing it in his own case, he removed the original soil near the part affected, and supplied its place with sand. He then placed pieces of tile; on those he laid mortar, and tiles over them, pushing them under the wainscot, so that it had no communication with the joists or floor. Pillars in like manner should, he thinks, be kept from the earth. And in laying a floor upon the ground, he should take away the earth for a foot in breadth, and four inches in depth, all round the walls, and place the ends of the joists in mortar, covering them with tiles pressed under the floor and wainscot, quite to the outward wall. Iron or tin plates would do; but are not so cheap as mortar and tiles, and probably much less durable in such situations. It is supposed that this plant has no adhesive powers, but in contact with wood. If it could pass over brick and mortar, it might be seen to spring from the cellars and infect half the houses in the kingdom. He recommends, in short, that the wainscot be kept free from contact with the joists and floor.

It is observed that the leaves of the plant appearing exhausted and dead, is owing to their having imparted all their

juices to the wood, which change it to a fungus, and not to a powder, like rottenness from length of time. And that nothing is more easy than to prevent the damage from the plant. Besides what he has said above, he is positive that a tile laid close along the walls round the room, would prevent the growth of the plant, even without mortar; and perhaps it is only necessary where the walls are next to the air. And charring the ends of the joists for a few inches, and the side of the wainscot at bottom next the wall, would, he supposes, be sufficient; for the plant cannot adhere to any thing but wood, and that possessed of its natural juices, to a certain degree; so that he questions if old dry oak would receive it. But all the white soft woods, as beach, poplars, and deals, are for a long time ready to receive it. Repairing the damage with fresh wood, without removing the earth and plant, is only feeding the evil, or extending the disease. It is supposed, that as the plant is of the creeping kind, and cannot rise two inches, the wood, in all cases, must be in contact with the earth to support it. He adds, that a fungus broader than the palm of one's hand, and an inch or more in thickness, is commonly seen at the bottom of an old post, on the surface of the earth; but it is not easy to discern whether the wood or the earth furnishes the matter.

The writer further remarks, that he had lately a conversation with an old friend, who shewed him two parcels of rotten wood, from an oak barn-floor laid about sixteen years ago. After lying twelve years, it shook upon the joists. On examination it was found to be rotted in various parts, and the planks, two inches and a half in thickness, were nearly eaten through, though the outside was glossy, and without blemish. The joists, and a large middle beam, were laid at the ends, in brick and mortar, to create a firm level. No earth was near the wood; and, he thinks, that no air could find a passage. The rottenness was partly an impalpable powder, of the colour of Spanish snuff, and other parts were black, as if burnt; the rest was clearly a fungus. And that this gentleman is a person of undoubted veracity; but a nice and exact observation is necessary in such examinations. He thought nothing of any plant, and it is likely there was none of the *boletus*; so that his assertion that it was always to be found, was rather too systematic. He asked him if the timber was dry when laid down. He could not however say that had been particularly adverted to. It had been sawed from a large oak, and was, as he thought, in all respects proper for a barn-floor. As this seems not the operation of the *boletus*, he asks, how did it happen? We know that the oak, when in vegetation, is subject to what we shall call an exudation of juices, which produces the fungus, named the *agaric* of the oak, with which the Druids of old played many tricks. The oak, then, if sawed into thick quantities, may emit these same juices, as the progressive course of nature to its entire decay. It is added that we have all seen oaks of vast size and ancient record, with a great part of the outside whole, and all the inside gone; perhaps the work of a century. In all hollow trees fungus is discoverable. To use a law term, it is a misnomer to call it dry rot; for the rotting principle is in moisture. He further states, that he had never seen the rot upon so large a scale in timber, till lately. The prevention then of beams, rafters, large joists, and posts put into the earth, from decay by the rot, is by charring only, which will dry up all the fungus juices of wood in large substance. Paint, or a bituminous preparation, may probably stop up the pores, and prevent the rot in slight work, where the treatment he before observed, with fire, might be incom-

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inconmodious, as to half-inch waincot, &c. The incorruptibility of charcoal is proved by a variety of indisputable facts.

A great many useful facts on this subject have been stated by Mr. Batson, of Limehouse, in the twelfth volume of the same Transactions, in respect to his methods of preventing the dry rot in a room much affected with it. The mode he adopted was to clear the ends of his timbers, to take away the infected earth to the depth of two feet, and to fill up that space with anchor-smith's ashes, or ashes from a foundry, before his flooring boards were laid.

And on minute examinations being made under the direction of the society, at the distances of six and twelve years after the flooring was laid, the boards, waincot, and timbers, were all found entirely free from any appearance of the dry rot. The use of stone-work next the ground, as the foundations of posts, door frames, partitions, &c. has also been found useful in preventing such wood-works from being attacked by this disease. And also the causing a more free circulation of air about such foundations by the fixing of iron gratings in stone-work in different places, so as to produce the most perfect ventilation. But notwithstanding all that has yet been done in respect to the nature and modes of preventing this sort of rot, much still remains to be effected both in regard to the nature of its origin, and the most certain means of eradicating it under different circumstances.

It will probably, however, be found the best and most effectual plan, until further trials and discoveries have thrown more full and complete light on its nature and causes, to take care that the wood-works near the ground in all buildings in such places as rot timber have as little contact with it as possible, by being raised and supported at some distance from it, by means of solid stone or brick and mortar work, by a full and free circulation of air being every where admitted in the foundations near such wood-works, by being careful to make use of such timber only as is perfectly well seasoned and prepared, and by having constantly a sufficient number of drains made all round to discharge any moisture that may occur. It may likewise be of farther advantage in all such cases to avoid painting or coating over the wood-work near the parts which are liable to be diseased or become rotten, for some considerable length of time after they have been done; as well as to allow of large fires to be occasionally made, where convenient, as near to such situations as possible, in order that every sort of moisture and dampness, together with the peculiar rawness of such new works, may always be removed as much as they are capable of in the first instance, or as soon after the works have been finished as may be compatible with their nature and extent.

In regard to the *boletus lachrymans* being the cause of the dry rot in timber, it has lately been contended that the different sorts of fungus, which are met with upon decaying timber of different kinds, are the production of the remaining powers of life in the sap of the unseasoned wood; and that the same sort of living organizable matter, which, whilst its powers continued in their perfect condition, would have generated the branch of an oak, will, when debilitated and enfeebled, give existence to a certain kind of fungus, and become the cause of this disease.

Mr. T. Wade, in a recent publication, observes, that the term dry rot seems to be improperly applied to the decay in timber, which it is generally employed to designate, and that the impropriety of the expression, probably, has not a little contributed to involve this subject in obscurity. A very short advance in the investigation of this subject will shew,

that moisture is a condition necessary to the putrefactive process, and that water is the most efficient agent in the decomposition of organized bodies.

By capillary attraction fluids are carried to the tops of the highest trees, a phenomenon which has been long observed, but has not been satisfactorily explained. Precisely the same effect takes place when one end of a piece of timber is immersed in water, or placed in a damp situation. It happens even in vacuo.

Timber, so placed, at first swells, after some time it changes colour, then it emits gases which have a mouldy or musty smell. In the more advanced period of decay, the mass dries, and cracks in transverse directions. Lastly, it becomes pulverulent, and forms vegetable mould. Generally, in some of these stages of decomposition, the different species of fungus are found to vegetate on the moss.

When a vegetable is deprived of life, the matter constituting it begins to undergo changes in order to enter into new combinations. It is reduced to simple principles by the aid of warmth, and the presence of air and water. In houses, ships, &c. we cannot prevent the influence of these powerful agents, but it may be retarded. It seems the usual mode of seasoning timber by exsiccation is of little use. Timber, thus prepared, is found, indeed, to shrink and lose much of its weight; but even very old oak timber, (procured from ancient buildings,) when immersed in water, or exposed in a damp situation, readily acquires the weight, and swells to the dimensions of green timber, from which, in its properties, it does not materially differ.

Mr. Wade therefore endeavoured to discover some other means by which timber may be made to resist change, or decay.

Lignum vitæ, box, ebony, &c. are nearly indestructible, owing to their being of so close a texture that water cannot be absorbed by them, neither do they give out any soluble matter to water, at least not without long boiling, or digesting at a very high temperature. Therefore the great agent that determines the changes in wood in general, here has not any influence.

Other durable woods, such as teak, cedar, &c. though of an open grain, and very porous, contain resinous, or oleaginous matter, repelling moisture, which cannot insinuate itself, as is the case with the feathers of some fowls, &c. On these principles the common perishable woods may be made to resemble those which are very lasting, or, indeed, nearly indestructible.

Thus, to prevent the decay of oak, &c. it is necessary either to cause it to be incapable of absorbing moisture, or to render the ligneous fibre insoluble.

Some of the effects produced bear considerable analogy with tanning, by which process a skin, entirely soluble in water, forming jelly or glue, and quickly susceptible of putrefaction, is made into leather, a substance not at all soluble in water, and capable of enduring for a long period, sometimes for several centuries.

For various methods of performing this, we beg to refer the reader to Mr. Wade's book, in which the operations recommended seem simple and economical.

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spouty foil, whose larger roots have been injudiciously hacked at the time of transplanting, or in cutting out a neighbouring plant. In this case the disease affects the pith, eats upward, and often consumes the heart to such a degree, while the bark remains in a perfectly sound state, that the trunk is enfeebled, and easily broken. This is demonstrated by cutting affected trees at different ages, and the *rot* is generally found less or more advanced upward, according to the size of the cavity. He here states a very curious instance of this species of rot, that occurred at Wemyss castle, in Scotland, in 1795. In thinning a wood, whose trees consisted chiefly of elm and ash, in one part of it the soil was observed to be spouty, and the elm-trees in rather a sickly condition. Every elm-tree cut in this part was more or less affected; some were rotted a foot, others two, three, &c. feet upwards, and the wood above, to the extremity of the bole, was uniformly found, and sold at two shillings a foot. One beautiful ash-tree, in particular, was sold standing, at the rate of half a crown a foot of timber; nor was there the smallest outward blemish from the ground to the very top. When it was cut down, a completely ready made *pump*, fifteen feet in length from the ground upwards, was discovered, and actually, as he was afterwards informed, applied as such. It is conceived that in this case the remedy is to be at all due pains to prevent the cause, by carefully draining the soil of poisonous, ochry water, and when necessity occasions the cutting of large roots, to treat them in the manner of an amputated branch.

And a third cause of the rot which he notices, is that of stagnant water lodging in the angle formed by the stem and an upright branch, or in the angle formed by rival stems, where no actual ground has ever been made; but, which often happens, if the tree be in a youthful vigorous state, a cup or hollow is formed, resembling that between the thumb and finger half opened. Here the water lodging, in time penetrates the bark, and forms the first receptacle of corruption, which being once begun advances apace to the great injury of the trees. In this case the first thing necessary towards a cure, or prevention of further injury, is to clean out the water, (for which a syringe may be useful,) dust, &c. and dry the whole well by aid of a mop or woollen cloth; then to fill it up, until it run over, with tar; after which to fix on an apron of thin lead, in such a manner as that its edges may reach about a foot upwards on each limb of the tree, being joined close, and fastened with saddle tacks, &c.

The composition advised by Mr. Forsyth is probably much better for the purpose, as being less liable to decomposition; and at the same time capable of being applied with greater exactness. It is remarked by the first writer that knots or excrescences are frequently found on the boles and branches of trees, particularly of elms. What may have occasioned them, in many cases, is not easily accounted for; but it is sometimes obvious that they proceed from bruises, or the mal-treatment of trees in youth. In this case we frequently find them hollow within, and full of water, which, if not removed, will of a certainty induce the rot. And he advises that when the knot is quite entire on all sides, and perfectly sound, which may be known by striking it with a mallet, it should be suffered to remain. But that when it is found hollow, as above, it should be sawn clean off, the wound should be smoothed, as already directed, cleaned, dried, and laid over with tar, &c. The composition before-mentioned is, however, here probably preferable for the same reason as in that case. See *Composition for TREES*, and *TIMBER-Trees*.

In cases where the internal parts of trees of the timber

kind become rotten, and get hollow, in consequence of the above, or other causes, as not unfrequently happens to the oak and elm, as well as different other kinds, especially when they are of some considerable length of growth, it has been directed, in order to restore them, that the decayed and rotten wood should be cut out at different times, as the new wood comes in contact with it; great care being taken not to cut too much at any one time, but to leave enough to support the trees, and prevent them from being blown down by high winds, until the new wood is strong enough for that purpose: the remainder may then be cut out, as there will be no danger. By these means, the application of his composition, and heading down, it has been asserted by the late Mr. Forsyth, that a great number of rotten hollow trees, which had, when taken in hand, little more than the bark remaining sound, have within a few years been entirely filled up; and others, that were headed down within a few feet of the ground, have had their stumps completely covered by the leading shoots, forming handsome trees; the places at which they were headed being only discerned by faint cicatrices.

It is stated that a lime-tree, about 18 inches in diameter, whose trunk was decayed, rotten, and hollow, from the top to the bottom, and to which, after cutting out the decayed wood, the composition had been applied about 16 years before, was lately cut down for the purpose of ascertaining the progress it had made in the interior part, and was found entirely filled up with new found wood, which had completely incorporated with what little old wood remained, when it was first taken in hand. Its body has been cut into short lengths, in order to be shewn, for the sake of convincing those who may be doubtful on the subject.

Also an old elm, the inside of which was totally decayed, and out of which were taken, at different times, two large cart-loads of rotten wood, has made shoots more than 20 feet high in the course of six years. Several others of different sorts are likewise stated to have made equally fine shoots in this mode of treating them, and are now fine thriving trees; the marks of the places at which they were headed down being scarcely perceivable. A lime, the hollow part of which is 11 feet in height, is now, it is said, filling up: the tree is about a foot in diameter. A decayed part, 4 feet long and 28 inches broad, in a large elm, is now, too, stated to be rapidly filling up with sound wood. About two feet and a half in length on one side, which was for some time left to nature, still continued, it is said, to decay, till the composition was applied: new wood and bark are now asserted to be forming in the part. Besides these, a great many other trees of the same kind, some of which had wounds ten feet long and two feet broad, are now also said to be entirely filled up, as well as many sycamores, oaks, and other forest-trees, restored to a flourishing state by having the dead wood cut out, and the composition applied.

However, notwithstanding these and many other similar statements, a variety of doubts and objections have been raised and entertained against this mode of filling up and curing the decayed and rotten parts of forest-trees, by persons of much information and experience on the subject of vegetable economy; so that additional facts, and more careful and exact conclusions from them, are probably necessary before the utility or inutility of the method can be fairly appreciated or fully ascertained.

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Rot in *Hops*, a disease in this sort of crops, which is very similar to that of the mould. See *HOP* and *MOULD*.

Rot, in *Geography*, a river of Wurtemberg, which runs into the Lein.

ROTA, a town of Spain, in the province of Seville, on the coast of the Atlantic, celebrated for its wine; 3 miles W. of Puerto de Santa Maria.

ROTA. See ZARPANA.

ROTA, in *Mechanics*. See WHEEL.

ROTA Aristotelica, *Aristotle's Wheel*, is the name of a celebrated problem in mechanics, founded on the motion of a wheel about its axis; thus called, because first, that we know of, taken notice of by Aristotle.

The difficulty is this. While a circle makes a revolution on its centre, advancing at the same time in a right line along a plane, it describes, on that plane, a right line, equal to its circumference. Now if this circle, which we may call the *deferent*, carry with it another smaller circle, concentric with it, and which has no motion but what it receives from the deferent; which is the case of the nave of a coach-wheel carried along by the wheel; this little circle, or nave, will describe a line in the time of the revolution, equal, not to its own circumference, but to that of the wheel: because its centre advances in a right line as fast as that of the wheel does; as being in reality the same with it.

The matter of fact is certain; but how it should be, seems a mystery. It is obvious that the wheel, advancing during the revolution, must describe a right line equal to its circumference; but how would the nave, which revolves like the wheel, describe a right line so much greater than its circumference?

The solution Aristotle gives is no more than a good explication of the difficulty. Galileo, who next attempted it, has recourse to an infinity of infinitely little vacuities in the right line described by the two circles; and imagines that the little circle never applies its circumference to those vacuities; but in reality only applies it to a line equal to its own circumference; though it appears to have applied it to a much larger.

But it is evident, that this is all gratis dictum. The vacuities are imaginary; and why does not the great circle apply its circumference to them? Lastly, the magnitude of these vacuities must be augmented or diminished, according to the different proportion of the two circles.

F. Tacquet will have it, that the little circle, making its rotation more slowly than the great one, does on that account describe a line longer than its circumference; yet without applying any point of its circumference to more than one point of its base. But this is no more allowable than the former.

The attempts of so many great men proving vain, M. Dortous de Meyran, a French gentleman, had the good fortune to hit on a solution, which he sent to the Royal Academy of Sciences; where being examined by Messrs. de Louville and Saulmon, appointed for that purpose, they made their report, that it was satisfactory. The solution is to this effect:

The wheel of a coach is only acted on, or drawn in a right line; its circular motion or rotation arises purely from the resistance of the ground on which it is applied.

Now this resistance is equal to the force with which the wheel is drawn in the right line, inasmuch as it defeats that direction; of consequence, the causes of the two motions, the one right, the other circular, are equal; and, therefore, their effects, *i. e.* the motions, are equal. And hence the wheel describes a right line on the ground equal to its circumference.

As for the nave of the wheel, the case is otherwise. It is drawn in a right line by the same force as the wheel; but

it only turns round because the wheel turns, and can only turn with it, and at the same time therewith.

Hence it follows, that its circular velocity is less than that of the wheel in the ratio of the two circumferences; and, therefore, its circular motion is less than its rectilinear one.

Since then it necessarily describes a right line equal to that of the wheel, it can only do it by sliding, or what they call the motion of rotation; that is, a part of the circular nave cannot be applied to a part of a right line greater than itself but by sliding along that part, and that more or less, as the part of the nave is less than that of the circle. See ROTATION.

ROTA is also used for a particular court of jurisdiction in Rome, established for taking cognizance of beneficiary matters, &c.

The rota consists of twelve doctors chosen out of the four nations of Italy, France, Spain, and Germany; three of them being Romans, one a Florentine, one a Milanese, one of Bologna, one of Ferrara, one a Venetian, one a Frenchman, two Spaniards, and one a German; each having four clerks or notaries under him.

Their office is to judge of all beneficiary causes, both within Rome, and throughout the state of the church, in case of appeal, and of all civil processes which are for above five hundred crowns.

They are also called *chaplains* of the pope, as succeeding the ancient judges of the sacred palace, who held their court in his chapel.

The denomination *rota*, *wheel*, some will have derived hence, that they officiate by rotation; others, because the most important affairs of the Christian world turn upon them. Du-Cange derives it from *rota porphyretica*, because the pavement of the chamber where they formerly sat was of porphyry, and fashioned like a wheel.

ROTA, LA, in *Biography*, an admirable bravura singer in the Incurabili Conservatorio at Venice, in 1770, under the regency of Galuppi.

ROTAB, in *Geography*, a river of Saxony, which runs into the Saale, three miles S. of Lena.

ROTACEÆ, in *Botany*, the 20th natural order among the *Fragmenta* of Linnæus, named from *rota*, a wheel, in allusion to the form of the *corolla*, which is wheel-shaped, *rotata*. No commentary upon this order is found in the lectures of Linnæus, published by Giseke. The genera stand thus; *Trientalis*, *Centunculus*, *Anagallis*, *Lyfimachia*, *Phlox*, *Exacum*, *Chlora*, *Gentiana*, *Sveritia*, *Chironia*, and *Sarothra*. To which are subjoined, in a separate section, *Achyrum*, *Hypericum*, and *Cistus*; these surely have little affinity to the rest.

ROTACH, in *Geography*, a river of Bavaria, which runs into the Maine, near Lichtenfels, in the bishopric of Bamberg.

ROTAL, or **ROTTE**, a small island in the East Indian sea, where a Dutch factor resides, who trades with the natives in the chief article of their produce, which is sugar. The north end of this island, and the south end of *Timor* (which see), lie N. $\frac{1}{2}$ E. and S. $\frac{1}{2}$ W., and are about three or four leagues distant from each other. At the west end of the passage between *Rotte* and *Semau* (which see), are two small islands, one of which lies near the *Rotte* shore, and the other off the south-west point of *Semau*, with a good channel between them, about six miles broad. The isle of *Rotte* has not so lofty and mountainous an appearance as *Timor*, though it is agreeably diversified by hill and valley. On the north side are many sandy beaches, near which grow some trees of the fan palm; but the far greater part was covered

covered with a kind of brushwood without leaves. Cook's Voyage by Hawkefworth, vol. iii. p. 264.

ROTALA, in *Botany*, so named by Linnæus, from *rota*, a wheel; apparently in allusion to the spoke-like appearance of its numerous radiating whorled leaves.—Linn. Mant. 2. 143. Schreb. 33. Willd. Sp. Pl. v. 1. 189. Vahl. Enum. v. 2. 26. Mart. Mill. Dict. v. 4. Jufl. 303.—Class and order, *Triandria Monogynia*. Nat. Ord. *Caryophylli*, *sect.* 3, Linn. *Caryophylleis affine*, Jull.

Gen. Ch. Cal. Perianth inferior, of one leaf, tubular, membranous, three-toothed, permanent. Cor. none. Stam. Filaments three, capillary, the length of the calyx; anthers roundish. Pist. Germen superior, ovate; style thread-shaped; stigma three-cleft. Peric. Capsule ovate, obscurely triangular, inclosed in the calyx, of three cells, and three valves. Seeds numerous, roundish.

Eff. Ch. Calyx three-toothed. Corolla none. Capsule of three cells, with many seeds.

1. *R. verticillaris*. Linn. Mant. 2. 175. (Enc. pael; Rheede Malab. v. 9. 159. t. 81.)—Native of wet situations in the East Indies, from whence it was sent by Koenig to Linnæus. A small annual herb, quite smooth, four inches, or more, in height, erect, branched, having the aspect of an *Ammannia*, as Vahl, from the inspection of the only known specimen, in the Linnæan herbarium, remarked. Root with many rows of whorled fibres. Stem and branches reddish; quadrangular in the upper part. Leaves from four, or five, to eight in each whorl, sessile, linear, entire, bluntish, or somewhat emarginate, at the end, about half an inch long; paler, with a prominent rib, beneath. Flowers axillary, small, sessile, solitary, pale; their permanent calyx membranous and pellucid, globular, investing the fruit, about the size of a mustard seed.

ROTAS, in *Geography*, a town of Hindoostan, in Lahore, 81½ miles N.W. by N. from Lahore. N. lat. 32° 58'.

ROTAS, a circar of Hindoostan, in the foubah of Bahar, bounded on the N.E. by Boujapour, on the E. by Bahar Proper, on the S. by Palamow, on the W. by the circar of Bidzigur, on the N.W. by Chunar; its form approaching to a square about 58 miles each way. The chief towns are Rotafgur and Saferam.

ROTASGUR, a town of Hindoostan, in the above-mentioned circar, situated on the river Soane; 94 miles S.W. of Patna. N. lat. 24° 38'. E. long. 84° 2'.

ROTATA, COROLLA, in *Botany*, a monopetalous corolla, whose tube is as short as possible, and the limb horizontally extended, like the form of a wheel. This differs from a falver-shaped corolla, in the want of an elongated tube. See COROLLA.

ROTATION, in *Mechanics*, is a term used to denote the motion of the several parts of a solid body about an axis, called the axis of rotation, and which may be either *fixed* or *spontaneous*, according as the body is constrained to make its revolution about a determinate point or line, or is free to revolve in any direction from a momentum impressed upon it in space.

We have already treated of several cases of rotatory motion, under our articles CENTER of Gyration, PERCUSSION, OSCILLATION, &c. and it therefore only remains, in this place, to offer some general remarks with regard to such motion, and to enumerate a few of the most important particulars relating to this interesting branch of mechanics.

When a solid body turns round an axis, retaining its shape and dimensions unaltered, every particle is absolutely describing a circle round this axis; which axis passes

through the centre of the circle, and is perpendicular to its plane. Moreover, in any instant of its motion, the particle is moving at right angles with the radius vector, or line joining it with the centre of rotation: therefore, in order to ascertain the direction of the particle, we may draw a line from that particle perpendicular to the axis of rotation. This line will be in the plane of the circle of rotation of that particle, and will be its radius vector; and a line drawn from the particle, perpendicular to its radius vector, will be a tangent to the circle of rotation, and will represent the direction of the motion of this particle.

The whole body being supposed to turn together, it is evident, that when it has made one complete rotation, each point has described the circumference of a circle, and the entire paths of the different particles will be in the proportion of these circumferences, and therefore of their radii: and this is also true of any portion of these circumferences; that is, the velocities of the different particles are proportional to their radii vectors, or to their distances from the axis of rotation; and all these motions are in parallel planes, to which the axis of rotation is perpendicular. Hence it follows, that when we compare the motion of different revolving bodies with respect to velocity, it is evident that it cannot be done by directly comparing the velocity of any particle in one of these bodies with that of any particle of the other; for as all the particles of each have different velocities, this comparison can establish no ratio. But we may familiarly compare such motions, by the number of complete turns which they make in any equal portions of time; and, therefore, as the length or number of feet described by any body, in rectilinear motion, is a proper measure of its progressive velocity, so the angle described by any particle of a revolving body is a proper measure of its motion or rotation: and in this manner may the motion of two or more bodies be compared, and this velocity is with propriety called the angular velocity.

Again, with respect to the motion of bodies at liberty to move freely by the action of any force impressed; if any such body receives an impulsion in any direction, which does not pass through the centre of gravity, the motion which ensues is a rotatory one. For if, at the same moment, a body is impelled according to any direction AB, (*Plate XXXVII. Mechanics, fig. 9.*) not passing through the centre of gravity, an equal and opposite force is exerted upon the body in a parallel direction, CG passing through the centre of gravity, that centre will manifestly be kept at rest: nevertheless it is clear, that the other parts of the body will not be in a state of quiescence, because the two forces, though equal, are not directly opposite; so that the only motion that the body can have, its centre of gravity being at rest, is evidently a motion of rotation about that centre. Now the fixed axis, about which the body revolves, is pressed by the impelling force, while it generates rotatory motion; but the axis, being by hypothesis immoveable, re-acts equally against that pressure; and, when it passes through the centre of gravity, would, as above stated, cause each particle to move with the same velocity, and in the direction of the force. If, then, the force which presses against a fixed axis, in given circumstances, be ascertained, the motion of the body in free space, when the axis is removed, will be known; for the latter motion will consist of the rotatory motion about the axis passing through the centre of gravity, considered as fixed, compounded with the motion of the centre of gravity caused by the force now at liberty to impel the centre, the fixed axis which passes through it being removed.

When a solid body receives an impulse on any one point,

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or that point is urged in any way by a moving force, it cannot move unless the other points, with which it is connected by the force of cohesion, move also; except the force of impulsion is sufficient to overcome that of cohesion, a case which is not meant to be considered here. And whatever is the motion of any particle, that particle must be conceived as urged by a force precisely competent to the production of that motion, by acting immediately on the particle itself. The particle, immediately impelled by the external force, is either pressed towards its neighbouring particles, or is drawn from them; and by this endeavour to change its place, the connecting forces are exerted, or brought into action. We are but little acquainted with these connecting forces; but this is of little importance in a mechanical point of view; for the fact, that the forces by which the molecules of bodies act on each other are equal, is quite sufficient for our present purpose.

After these general remarks, let us endeavour to illustrate the principles above laid down in the solution of a few of the most obvious and most practical cases relating to this important branch of dynamics.

Let *A F G H* (*Plate XXXVII. Mechanics, fig. 1.*) represent the circumference of a wheel, which turns in its own plane round a horizontal axis, passing through *S*, its centre; and let a weight *P*, fixed at the extremity of a line *A P*, communicate motion to the wheel. Let also the whole weight of the wheel be *Q*, and suppose this weight to be collected uniformly into the circumference *A F G H*: then during the descent of the weight *P*, each point of the circumference must move with a velocity equal to that with which *P* descends; and consequently since the moving force is the weight *P*, and the mass moved *P + Q*, the force which accelerates *P* in its descent will be that part of the accelerating force of gravity which is expressed by the fraction

$\frac{P}{P + Q}$. The velocity, therefore, that is generated in *P*,

in any given time, is found by means of the general formula, given under the article *ACCELERATED Motion*; that is,

$$v = 2ft, \quad v = \frac{2Pgt}{P + Q};$$

and the space through which it has passed in the same time is $s = \frac{Pgt^2}{P + Q}$. Thus, for

example, if *P* and *Q* were equal to each other, then

$$\frac{P}{P + Q} = \frac{1}{2}, \quad v = gt, \quad \text{and} \quad s = \frac{1}{2}gt^2.$$

The parts of the weight *Q*, which are uniformly disposed over the circumference *A F G H*, balance each other round the common centre of gravity *S*; their weight, therefore, has no effect in accelerating or retarding the descent of *P*; and this will be the case, whenever the axis of motion passes through the common centre of gravity. But in order to render the properties of rotatory motion more obvious, it will be convenient to dispose the parts of the revolving system, so that the axis of motion shall not necessarily pass through the common centre of gravity. Thus, referring to the preceding figure, instead of supposing the weight *Q* to be uniformly collected over the circular rim *A F G H*, let it be collected into any point *Q*. Here it is evident, that if the mass *Q* be acted upon by gravity, the force which communicates motion to the system round *S* will be variable; it being the greatest, when *SQ* is horizontal; and gradually diminishing, till *Q* has descended to its lowest point.

But in order to begin first with the simplest case, the

moving force should be constant, as it will be, if we suppose the mass that is collected in *Q* to be destitute of weight, and to possess inertia only: it follows, therefore, that during the revolution of *Q* round *S* as an axis, the moving force will be constantly equal to *P*, and the mass moved = *P + Q*, and consequently the force which accelerates the descending weight, or any point in the circumference,

will be that part of gravity which is expressed by $\frac{P}{P + Q}$, the same as before.

In these cases, the force which communicates motion to the system has been supposed a weight, or body, acted on by the earth's gravity, and consequently constitutes a part of the mass moved, at the same time that it acts as a moving force. But motion may be communicated by a force, which shall add nothing to the inertia of the matter moved; as, for instance, steam, muscular power, &c.: and it will, therefore, be convenient, in many investigations, to assume the moving force of this kind. The inertia of the moving force *P*, therefore, in the subsequent propositions, will not be taken into the account, unless expressly mentioned. Thus, if any number of bodies without gravity, being collected into the points *F, H, Q*, are caused to revolve round the axis *S*, by a moving force *P*, the force which accelerates these bodies in their revolution will be

$\frac{P}{F + H + Q}$, when *P* is without inertia; or it will be

$\frac{P}{F + H + Q + P}$, when *P* is possessed of inertia; the

bodies *F, H*, and *Q*, as also the power *P*, being supposed to act at equal distances from the axis of motion.

But when bodies revolve at unequal distances from the axis, their velocities being different, other formulæ will be necessary for determining the force whereby any given point of the system is accelerated.

Let *B* (*fig. 2.*) represent a material point, moveable about an axis of motion passing through *S*: with the centre *S*, and distance *SD*, describe a circle *DGH*. Now if *B* be connected with every point in the area of the circle, which is an inflexible substance, no force can be applied to move the circle, but what must communicate the same angular motion to *B*. Let us suppose this force to be *P*, acting on the circumference of the inflexible circle *DGH*, by means of a line passing over the same, to which *P* is connected. Now the absolute force of *P* to move *D*, or any point in the circumference, will be *P*; but the communication of motion to this point *D* is resisted by the inertia of the body *B*, which being moved with a different velocity, and acted on by a different moving force, its inertia is not to be estimated by its quantity of matter only, but by considering what mass or quantity of matter which, when disposed at the distance *SD*, will oppose the same resistance to the descent of the weight *P*, as the body *B* itself does, when acting at the distance *SB*.

In order to estimate this, we must consider that when any two bodies are put in motion by two constant forces acting for the same time, the quantities of matter moved are in a direct ratio of the moving forces, and in the inverse

ratio of the velocities generated; that is, if $\frac{M}{m}$ expresses

the ratio of the moving forces, $\frac{Q}{q}$ that of the quantities of

matter, and $\frac{V}{v}$ that of the velocities generated; the rela-

tion

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tion of these quantities is defined by the equation $\frac{Q}{q} = \frac{A \times SA^2}{SD^2} + \frac{B \times SB^2}{SD^2} + \frac{C \times SC^2}{SD^2}$; these being collected into the points $a, b,$ and $c,$ respectively; and the moving force in this case being $P,$ and the mass moved

$\frac{M}{m} \times \frac{V}{v},$ by the laws of rectilinear motion. To apply this, it must be observed, that although the absolute force of the weight $P,$ acting upon the point $D,$ remains constantly the same, yet its effect upon bodies placed at different distances from the axis of motion are in the inverse proportion of those distances; therefore, the moving forces exerted by $P,$ on the points B and $D,$ will be in the proportion of SD to $SB.$ Also, by the problem, the angular motion of D and B are equal; and, consequently, the velocity of B is to the velocity of $D,$ as SB to $SD.$ And since the quantities of matter in $B, D,$ are in the direct proportion of the moving forces, or of SD to $SB,$ and in the inverse proportion of the velocities generated, or of SB to $SD,$ we shall have the quantity of matter in B to that contained in $D,$ as $SD^2 : SB^2;$ and consequently the weight

$$\text{ought} = B \times \frac{SB^2}{SD^2}.$$

The same may be otherwise found thus: let $x =$ the quantity of matter required to be collected in D, M the moving force which acts on B, m that which acts on $D,$

V the velocity of $B,$ and v the velocity of $D;$ then $\frac{B}{x} =$

$\frac{M}{m} \times \frac{v}{V},$ but $\frac{M}{m} = \frac{SD}{SB},$ by the property of the lever;

and $\frac{v}{V} = \frac{SD}{SB},$ by the nature of angular motion; there-

fore, $\frac{B}{x} = \frac{SD^2}{SB^2},$ and $x = B \times \frac{SB^2}{SD^2},$ as above.

Whenever, therefore, a body B revolves round an axis, by the action of a constant force $P,$ applied at a given distance, $SD,$ from the axis, in order to find the force which accelerates $D,$ the mass B may be supposed to be removed,

and instead of it an equivalent mass $B \times \frac{SB^2}{SD^2}$ collected in

the point $D;$ to which the force is applied. After which, the acceleration of the point $D,$ or any other point of the circumference, will be determined from the principles already explained; for the moving force being $P,$ and the

mass moved $B \times \frac{SB^2}{SD^2},$ the acceleration of $P,$ or $D,$ will

be that part of gravity expressed by the fraction $\frac{P}{B \times \frac{SB^2}{SD^2}}$

$= \frac{P \times SD^2}{B \times SB^2},$ while we suppose the power P void of in-

ertia; or by $\frac{P}{B \times \frac{SB^2}{SD^2} + P} = \frac{P \times SD^2}{B \times SB^2 + P \times SD^2},$

when the inertia of P is considered.

On the same principle, if any number of bodies, $A, B, C,$ &c. (*fig. 3.*) be put in motion round a fixed axis, passing through $S,$ by a constant force $P,$ applied at $D,$ the point D will be accelerated in the same manner, and consequently the whole system will have the same angular velocity. If, instead of $A, B, C,$ &c. placed at the distances $SA, SB, SC,$ &c. we substitute the bodies

lected into the points $a, b,$ and $c,$ respectively; and the moving force in this case being $P,$ and the mass moved

$\frac{A \times SA^2}{SD^2} + \frac{B \times SB^2}{SD^2} + \frac{C \times SC^2}{SD^2};$ the force which ac-

celerates D will be that part of the force of gravity that is expressed by the fraction,

$$\frac{P \times SD^2}{A \times SA^2 + B \times SB^2 + C \times SC^2};$$

or, if the inertia of P be considered, by

$$\frac{P \times SD^2}{A \times SA^2 + B \times SB^2 + C \times SC^2 + P \times SD^2}$$

The velocity of the point D is uniformly accelerated, because the force above determined is invariable: it follows also, that the angular velocity of the system is uniformly accelerated, because the absolute velocity of any point at a given distance from the axis of motion, is as the angular velocity of that point, and consequently of the whole system. It is also manifest, that it is of no consequence whether the bodies $A, B, C,$ &c. revolve in the same or different planes, if their distances from the axes $SA, SB, SC,$ &c. are the same, these distances being estimated by lines drawn from $A, B,$ and $C,$ perpendicular to the common axis of motion; if, therefore, they should be situated in various planes, they may be referred to any one given plane perpendicular to the axis.

It is obvious likewise, that changing the position of the bodies $A, B, C,$ in the same plane will not affect the force which accelerates the system, provided their respective distances from the axis of motion be not altered; thus, with the centre $S,$ and distances $SB, SC,$ let the arcs of circles be described; if B is transferred to $b',$ or C to $c',$ the moving force which acts on these bodies respectively will not be altered, and consequently the masses moved being likewise constant, the accelerating force will be the same.

All these propositions are equally true, whatever may be the force by which the angular motion is generated, provided it be constant; or, if variable, should its action be considered for an evanescent particle of time only.

We have here followed the method employed by Mr. Atwood in his treatise on "Rectilinear and Rotatory Motion;" being, as we conceive, the best calculated to convey a correct and elementary idea of the laws of rotatory motion. But it is obvious, that, instead of considering the given bodies $A, B, C,$ (*fig. 3.*) to be equivalent to other bodies placed at the distance $SD,$ we might enquire, at what distance from the centre of motion S all these bodies must be collected, without changing their masses, so that the same angular motion may be generated in the system? This point is called the *centre of gyration*; and as the method of finding this point has been already treated of under the article *CENTER,* we shall, in the subsequent part of this article, consider it as known, and shall proceed to the solution of a few such problems as appear best calculated for illustrating the subject under consideration.

PROP. I.

Let $D, E, F,$ (*fig. 4.*) represent a wheel, or cylinder, turning about an axis passing through its centre of gravity $S;$ round the circumference of which a perfectly flexible line is made to pass, and to the end of which a body, $P,$ is suspended;

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pended; then, having given the radius SD , the power P , and the weight of the wheel, or cylinder, DEF , it is required to determine the angular velocity generated in the system in a given time.

Let R represent the centre of gyration, and make $SR = r$, $SD = d$, the weight of the cylinder $DEF = w$, and the given power $= p$; then the force which accelerates the

point D is $\frac{pd^2}{wr^2}$, if we suppose p void of inertia; but if the inertia of p be considered, the force of acceleration is

$\frac{pd^2}{wr^2 + pd^2}$, the force of gravity being assumed unity; but

if the force of gravity be taken $16\frac{1}{2} = 193$ inches $= l$; and $3.14159 = c$, then, in the time t , the velocity generated in the point D , or descending weight P , will be represented by

$$v = \frac{2ltpd^2}{pd^2 + wr^2} \text{ inches in a second.}$$

And since the circumference of the circle $EDF = 2cd$, the angular velocity generated in the time t , will be

$$\frac{360^\circ \times 2ltpd^2}{2cd(pd^2 + wr^2)} = \frac{360^\circ ltpd}{c(pd^2 + wr^2)} \text{ degrees, or}$$

$$\frac{ltpd}{cpd^2 + cwr^2} \text{ revolutions in a second.}$$

1. On the same principles it will be found, that the angular velocity generated in the system during the descent of the weight p , through any space S , is

$$\text{ang. vel.} = \sqrt{\left(\frac{ls p}{c^2 d^2 p + c^2 r^2 w}\right)} \times 360^\circ \text{ degrees, or}$$

$$\text{ang. vel.} = \sqrt{\left(\frac{ls p}{c^2 d^2 p + c^2 r^2 w}\right)} \text{ revol. in a second.}$$

2. The space described by the weight p in its descent from rest during t seconds, is $s = \frac{l t^2 d^2 p}{d^2 p + r^2 w}$, and

consequently, the time of describing s is,

$$t = \sqrt{\frac{s d^2 p + s r^2 w}{l p d^2}} \text{ seconds.}$$

3. The space described by p from rest, while an angular velocity of n revolutions in a second is generated, is

$$s = \frac{n^2 c^2 d^2 p + n^2 c^2 r^2 w}{l p}$$

4. The force which accelerates the centre of gyration R ,

$$\text{is } f = \frac{p d r}{d^2 p + r^2 w}$$

5. The absolute velocity generated in the weight p , while it descends from rest through the space S , is

$$v = \sqrt{\frac{4 l s p d^2}{d^2 p + r^2 w}}, \text{ and the velocity of the point } R, \text{ is}$$

$$w = \sqrt{\frac{4 l s p r^2}{d^2 p + r^2 w}}, \text{ and the velocity generated in the}$$

point R , in the time t , is

$$w = \frac{2 l t d p r}{d^2 p + r^2 w}$$

All these results are drawn immediately from the known

formulae for accelerated motion, by making $f = \frac{p d^2}{wr^2 + p d^2}$

the accelerating force, as determined in the preceding part of this proposition.

In the above investigation we have considered the revolving system to be a uniform wheel, or cylinder; but, it is obvious, the same will have place for any system of bodies, provided only that the axis of motion passes through its centre of gravity, and that R be the centre of gyration of the system.

PROP. II.

Let ABC (fig. 5.) represent a wheel and axle, and let the axis be horizontal, having given its weight w , and the weight q applied to the circumference of the axle, and p applied to the circumference of the wheel, in order to raise q ; it is required to assign the space described by the elevated weight q from rest in any given time; the proportion of the radii of the wheel and axle being also known.

Here the absolute force which impels D is p , and since

q acts in a direction contrary to p , with a force $= \frac{q \cdot SA}{SD}$,

this must be subtracted from p , which gives $p - \frac{q \cdot SA}{SD}$

$= \frac{p \cdot SD - q \cdot SA}{SD}$ for the motive force which impels

D . Let the centre of gyration of the wheel and axle be R ; then suppose the mass of matter in the whole system removed, if the mass

$\frac{w \cdot SR^2 + q \cdot SA^2 + p \cdot SD^2}{SD^2}$

be concentrated in D , the point D will be accelerated in the same manner, as when the parts of the system are disposed as described in the problem. Since, then, the force

which impels $D = \frac{p \cdot SD - q \cdot SA}{SD}$, it follows that

this force, divided by the whole inertia, or the mass supposed to be concentrated in D , will give for the accelerative force on $D = \frac{p \cdot SD^2 - q \cdot SA \cdot SD}{w \cdot SR^2 + p \cdot SD^2 + q \cdot SA^2}$, and

the accelerative force on $q = \frac{p \cdot SD \cdot SA - q \cdot SA^2}{w \cdot SR^2 + p \cdot SD^2 + q \cdot SA^2}$.

Or, if we make $SD = n$, $SA = m$, $SR = r$, then the

accelerating force on D is $\frac{p n^2 - q m n}{w r^2 + p n^2 + q m^2}$.

If the inertia of the wheel and axle is not considered,

the above becomes $= \frac{p n^2 - q m n}{p n^2 + q m^2}$. And if the inertia

of p also $= 0$, then we have $\frac{p n^2 - q m n}{q m^2}$; or, if the mass

moved have no weight, but possess inertia only, as when it is drawn along a perfectly polished plane, as represented also

in fig. 5, then the accelerative force is simply $\frac{p n^2}{p n^2 + q m^2}$.

Let this accelerative force in any of the cases we have supposed

be supposed

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supposed be put = f ; then the space, velocity, time, &c. will be found immediately from the general formula

$$s = \frac{1}{2} t v = g f t^2 = \frac{v^2}{4 g f}.$$

Suppose, for example, $SD = n = 6$, $SA = m = 2$, then $SR = r = 6 \sqrt{\frac{1}{2}}$. (See *CENTER of Gyration*.) Let also $w = 10$, $p = 100$, $q = 40$. Then, by our first formula,

$$\frac{n^2 p - n m q}{w r^2 + p n^2 + q m^2} = \frac{36 \cdot 100 - 6 \cdot 2 \cdot 40}{10 \cdot 18 + 100 \cdot 36 + 40 \cdot 4} = \frac{3600 - 480}{180 + 3600 + 160} = \frac{3120}{3940} = \frac{156}{197},$$

the accelerative

force on D, that of gravity being 1. Whence the space passed through by the descending weight p in 1", is $s =$

$$g f t^2 = \frac{156 \cdot 16 \frac{1}{2}}{197} \text{ feet, or } \frac{193 \cdot 156}{197} \text{ inches.}$$

Whenever motion is communicated to any body, a certain resistance must have been overcome by the moving force: this resistance is of various kinds. 1. The inertia of the mass moved, whereby it endeavours to persevere in its state of quiescence, or of uniform motion in a right line. 2. That of a weight, or other absolute force, opposed to the action of the moving power. 3. Obstacles upon which the moving body impinging is retarded in its progress; such, for example, is the resistance which arises from the particles of a fluid through which a body moves. The estimation of these resistances, and their effects in retarding the motion of bodies acted on by a given force, are deducible from the laws of motion, and constitute a part of the solution of almost every problem relating to the motion of bodies.

The moving forces also are of various kinds; *viz.* gravity, muscular power, the impact of bodies solid or fluid, &c.; and the effect of these moving forces, which are exerted on bodies in order to create motion, exclusive of the resistance opposed to them, depend on the various circumstances of the time in which they act, and on the spaces through which the bodies moved are impelled, &c. Whence it follows, that, from the great variety of undetermined conditions which may enter into mechanical problems, there must be of course various ways of producing the same mechanical effect; and it is a very material part of the art, considered either in a theoretical or practical point of view, to proportion the means to the end, and to effect this with all the advantages that the nature of the case is capable of. It is the due observation of these particulars, which contribute to render the mechanic instruments complete, and the neglect of them defective, in their construction. This proper choice of means to produce mechanical effect, is frequently the result of long and continued experience, independent of theory; the knowledge of which, however, when immediately applied to practice, would save the artist much time and trouble; and, at the same time, be productive of other advantages which experience alone must be destitute of.

PROP. III.

In order to illustrate this application of theory to practice, let ABC (*fig. 5.*) be a wheel and axle moveable round an horizontal axis, passing through S, and a given weight q , which applied to the circumference of the axle, to be raised by the application of a given moving force, p , which is applied to the circumference of the wheel; let it be required to assign the proportion of the radii of the wheel and axle, so that the time in which the weight w ascends through any given space shall be the least possible.

Let the given radius of the axle $SA = m$, $SR = r$, $SD = x$; then, by the last proposition, the accelerative

force on p is $\frac{x^2 p - q m x}{w r^2 + p x^2 + q m^2}$, and that which accele-

rates q is $\frac{m x p - m^2 q}{w r^2 + p x^2 + q m^2}$; the square of the time,

therefore, in which any space S is described by the ascending weight q , is

$$t^2 = \frac{s}{l} \times \frac{w r^2 + p x^2 + q m^2}{m p x - m^2 q}, \quad (l \text{ being } = 193 \text{ in.})$$

and which, by the question, is to be a minimum. And which, therefore, put into fluxions, and reduced, gives

$$x = \frac{m q + \sqrt{(m^2 q^2 + p w r^2 + q p m^2)}}{p},$$

the radius required.

Or, if we do not consider the inertia of the wheel, then

$$x = \frac{m q + \sqrt{(m^2 q^2 + q p m^2)}}{p}; \quad \text{if } p = q, \text{ then } x =$$

$m + m \sqrt{2} = m(1 + \sqrt{2})$, the radius of the wheel in this particular case.

To give an example in numbers, let $q = 100$, $p = 33$, $w = 20$, $r = \sqrt{50}$, or $r^2 = 50$, $m = 1$, then the distance

$$\text{ought is } \frac{100 + \sqrt{(10000 + 33000 + 3300)}}{33} = \frac{315 \cdot 17}{33}$$

$= 9 \cdot 55$ inches.

This, therefore, will be the most convenient distance to apply the given moving force, when the chief object is to lessen the time of ascent. If it be required to assign the distance SD , when the momentum communicated to w , while it ascends through a given space, is the greatest possible, the solution will be the same as before, which, therefore, answers to two conditions; that is, it will render the time in which q ascends through a given space the least, and the momentum generated during the same ascent the greatest possible.

If the weight q , instead of ascending in a vertical direction, is drawn along an horizontal plane, as in *fig. 5*, the surface of which is supposed perfectly polished; then the weight q , as opposed to the moving force = 0, possessing in this case only inertia, we shall have for the radius of the wheel

$$x = \frac{\sqrt{(p w r^2 + p q m^2)}}{p} = \sqrt{\frac{w r^2 + q m^2}{p}}$$

which, if the inertia of w be rejected, becomes simply

$$x = \sqrt{\frac{q}{p}}.$$

Hence, if the quantity of matter to be drawn along the plane is four times greater than that which is contained in the moving force, the radius of the axle SA being given, in order that it may be impelled with the greatest velocity possible, and with the greatest momentum, the radius of the wheel should be double that of the axle, when the inertia of the wheel is not considered.

PROP. IV.

As a further application of our theory, let ABC, (*fig. 5.*) be a wheel and axle; when, having given a moving force or weight p , acting on the circumference of the

the

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the wheel in order to raise a weight q , which is applied to the circumference of the axle, it is required to assign the quantity q , when the momentum generated in it in any given time shall be the greatest possible; the inertia of the wheel and axle not being considered.

Making, as before, $SD = n$, $SA = m$, the force which

accelerates q is $f = \frac{n m p - m^2 q}{n^2 p + m^2 q}$; therefore, if $l = 193$

inches, the velocity generated in q in the time t will be

$2 t l \times \frac{n m p - m^2 q}{n^2 p + m^2 q}$, and the momentum generated in q will

be $2 t l \times \frac{n m p q - m^2 q^2}{n^2 p + m^2 q}$; and as this is to be a maximum

by the problem, its fluxion = 0, which being taken and

reduced gives $q = \frac{\sqrt{(n^4 p^2 + n^2 m p^2) - n^2 p}}{m^2}$.

Therefore, if $SD : SA :: n : 1$, then $q = p \sqrt{(n^4 + n^3) - n^2 p}$; if the radius of the axle equal the radius of the wheel, that is, $n = 1$; then the weight $q = p(\sqrt{2} - 1)$, and consequently the weight moved must be about $\frac{1}{2}$ ths of the moving force.

But if we introduce the weight of the wheel, and call it w , r being the distance of the centre of gyration from the axis, then the momentum generated in the time t will be expressed

by $2 t l \times \frac{n m p q - m^2 q^2}{w r^2 + n^2 p + m^2 q}$, which is the greatest possible

when $q = \frac{\sqrt{(n^4 p^2 + 2 n^2 r^2 p w + r^2 w^2 + r^2 n m p w + n^2 m p^2) - (n^2 p + r^2 w)}}{m^2}$

PROP. V.

Again, let $ABCH$ (*fig. 7.*) be a system of bodies moveable round a vertical axis, which passes through the common centre of gravity of the system. And suppose DEG to be a wheel, the axis of which is vertical, and coinciding with that of the system; let motion be communicated by means of a line going round this wheel, the string DP being stretched by a given weight p ; let it be required to assign the radius of the wheel EGD , so that the angular velocity communicated to the system in a given time may be the greatest possible. Let the weight of the system = w , and the distance of the centre of gyration from the axis of motion = r , the radius sought $SD = x$; then the motive force being p , the velocity generated in a given time in that

descending weight will be proportional to $\frac{p x^2}{w r^2 + p x^2}$, and

the angular velocity generated in the same time as $\frac{p x}{w r^2 + p x^2}$,

which is to be a maximum by the conditions of the problem,

we have, therefore, $\frac{p w r^2 \dot{x} + p^2 x^2 \dot{x} - 2 p^2 x^2 \dot{x}}{(w r^2 + p x^2)^2} = 0$,

whence $p w r^2 = p^2 x^2$, or $x = r \sqrt{\frac{w}{p}}$, the distance sought.

Supposing, therefore, the moving force = $\frac{1}{4}$ of the weight

of the system w , we shall have $x = r \sqrt{\frac{w}{\frac{1}{4} w}} = 2 r$; that is,

the weight should be applied at a distance from the axis, equal to twice the distance of the centre of gyration, in

order to produce the greatest angular velocity in a given time.

PROP. VI.

In order to increase the action of a given moving force against a weight to be raised, or resistance to be overcome, a combination of two or more mechanic powers is frequently made use of. Thus, let p be a power applied by means of a line to the vertical wheel C , (*fig. 6.*), and suppose the circumference of the axle K to be in contact with the circumference of the wheel B , so that the circumference of the wheel B may always move equally fast with that of the axis which belongs to C ; let also the axle of B communicate motion to the vertical wheel A , to the axle of which a weight, q , is suspended, so as to act in opposition to p ; moreover, let lmn to 1, be the sum of the ratios of the radius of each wheel to that of its axle; then if $plmn = q$, the two weights, p and q , will sustain each other in equilibrium; but if $plmn$ be greater than q , the equilibrium will be destroyed, and the weight q will ascend; and it is required to assign the space which, under those circumstances, will be described by q in a given time.

Let the radii of the wheel and axle A be in the ratio of l to 1; those of B as m to 1; and those of C as n to 1; the distance of the centre of gyration in A from the axis = r , the same of $B = r'$, and of $C = r''$; the weight of the wheel and axle $A = w$; that of $B = w'$; and that of $C = w''$.

Now the absolute moving force is p , but since q acts in opposition to it, it must be subtracted from p , in order to obtain the real motive force of the system. And since q

would balance a weight = $\frac{q}{lmn}$, if applied at p , the force

which impels p on the whole will be $\frac{plmn - q}{lmn}$. In the

next place, the inertia which resists the communication of motion to p must be ascertained. Now motion is communicated to the wheel A , from the circumference of the axle B , and the inertia of A , and of the weight q , which resists the communication of a force applied at $S = \frac{w r^2 + q}{l}$; in regard,

therefore, to the inertia of A and q , these may be supposed

to be removed, and the equivalent mass $\frac{w r^2 + q}{l}$ collected into

the circumference of the wheel A , or of the axle B . And since motion is communicated to B , by the circumference of the axle C , the inertia of B , together with

the equivalent mass $\frac{w r^2 + q}{l}$ will be $\frac{r'^2 l^2 w' + w r^2 + q}{l^2 m^2}$.

In like manner, since motion is communicated to C by the weight p acting at D , the inertia which resists the communication of motion to D or p , will be

$\frac{p n^2 + w'' r''^2}{n^2} + \frac{r''^2 l^2 w'' + w r^2 + q}{l^2 m^2 n^2} =$

$\frac{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r''^2 l^2 w'' + w r^2 + q}{l^2 m^2 n^2}$,

and the force which accelerates p in its descent from rest

= $\frac{lmn(plmn - q)}{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r''^2 l^2 w'' + w r^2 + q}$,

and

and

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and that which accelerates q

$$= \frac{p l m n - q}{E m^2 n^2 p + l^2 m^2 \omega'' r'' + r''^2 l \omega' + \omega r^2 + q};$$

if, therefore, we make this force $= f$, all the circumstances of the motion may be determined by the general formula

$$s = \frac{1}{2} t v = g f t^2 = \frac{v^2}{4 g f};$$

as before shewn. See a variety of other propositions in Atwood's treatise on "Rotatory Motion."

In all the preceding propositions, the axis of the revolving system has been supposed fixed; but there are other cases by which rotatory motion may be produced, which ought to be attended to in this article; such as that which ensue from a body descending down an inclined plane, having a ribbon or cord wound about it, one end of which is fixed at the upper part of the plane, which, by preventing the body sliding freely, causes a rotatory motion. The same effect also follows from the friction of the body against the plane; and the same may be imagined when there is no plane, but the body is left to fall freely, except so far as the cord wound about it shall produce a rotatory motion in its descent. We shall not attempt the investigation of these cases, but merely state the results that have been obtained; and must refer the reader for the former to the several treatises on dynamics, enumerated under the articles DYNAMICS and MECHANICS.

Let a body (*fig. 8.*) have a cord wound about it, either at its circumference, or any other part, as C, having one end fixed at a point above, as at D; then if the body be left to descend by the action of gravity, it will acquire a motion of rotation by the unwinding of the cord, and the space actually descended by the body in this case, will be to the space descended in the same time, when falling freely, as CG to CO; O and G representing the centres of oscillation and gyration when the point of suspension is at C. And the weight of the body will be to the tension of the cord, as CO to CG. The same ratios have place when the body descends down an inclined plane; the forces which generate the motion being both decreased in the same ratio.

The force by which spheres, cylinders, &c. are caused to revolve as they move down an inclined plane (instead of sliding), is the adhesion of their surfaces, occasioned by their pressure against the plane. This pressure is part of the weight of the body; for this weight being resolved into its component parts, one in the direction of the plane, the other perpendicular to it, the latter is the force of the pressure; and which, while the same body rolls down, the plane will be expressed by the cosine of the plane's elevation. Hence, since the cosine decreases, will the arc or angle increase. After the angle of elevation arrives at a certain magnitude, the adhesion may become less than what is necessary to make the circumference of the body revolve fast enough; and in this case, it will proceed partly by sliding, and partly by rolling; but the angle at which this circumstance takes place, will evidently depend upon the degree of adhesion between the surfaces of the body and plane. This, however, will never happen, if the rotation is produced by the unwinding of a ribbon, and it is on this latter supposition that the following particular cases are deduced.

Let W be the weight of the body, s the space descended by a heavy body falling freely, or sliding freely down a plane; then the space S, described by rotation in the same time, by the following bodies, will be in these proportions.

1. A hollow cylinder or cylindrical surface $S = \frac{1}{2} s$; tension $= \frac{1}{2} W$.

2. A solid cylinder $S = \frac{2}{3} s$; tension $= \frac{1}{3} W$.

3. A spheric surface $S = \frac{2}{3} s$; tension $= \frac{2}{3} W$.

4. A solid sphere $S = \frac{5}{7} s$; tension $= \frac{2}{7} W$. See Gregory's Mechanics, vol. i.

ROTATION, *Spontaneous*, is that rotatory motion which a body acquires when acted upon by any external force in free space. And the *centre of spontaneous rotation* is that point which remains at rest the instant the body receives its impulsion, or it is that point about which the body begins to revolve.

The most general method of treating this subject is with reference to three rectangular co-ordinates, after the method of Lagrange and other modern French writers; but as that method is not commonly adopted by English mathematicians, we must necessarily either enter at great length into explanation, or run the risk of not being understood by many of our readers, on which account we shall here adopt a similar mode of investigation to that which we have followed in the preceding part of this article.

First, then, we may observe, that when a body, B, (*fig. 9.*) of any shape whatever, receives an impulse, the direction of which does not pass through the centre of gravity, and takes in consequence two motions, as we have stated in the early part of this article, it is evident, that for an instant of time we may consider it as having only one motion, namely, a motion of rotation about a point or fixed axis, C, which may be either within the body, or out of it, according to its shape, and the distance, GS, between the centre of gravity and the direction of impact. If, while the line GS is carried parallel to itself from GS to G'S', we imagine that it revolves about the moveable point G, as the particles of the body have greater or less velocities, as they are more or less distant from G, it is manifest that there is upon SG a certain point, C, which will be found to describe from C' towards C an arc equal to GG', which, during an evanescent instant, may be regarded as a right line; in that case the point C will have been carried as far backward by its motion of rotation, as it will have been advanced parallel to GG' by the velocity common to all the parts of the body; the point C has, therefore, during this instant, been actually at rest in C; and may consequently be considered as a fixed point about which the body during such instant has a rotatory motion. This point is the centre of spontaneous rotation, and is the same as the centre of suspension, corresponding to the centre of percussion, the centre of percussion being the point where the body is struck.

Without entering into a minute demonstration of this property, we may convince ourselves of its truth, by considering that the action of a body against an immovable obstacle, in the centre of percussion, must have the same effect upon the body, as if that body had been at rest, and it had been struck by the obstacle; in which latter case, the centre of suspension would not be affected, and therefore it becomes the centre of spontaneous rotation. On which account it also follows, that the centre of spontaneous rotation is wholly independent of the magnitude of impact; but depends entirely on the distance that the force ϕS , or the result of all the forces, acts from the centre of gravity, G; and consequently, when that force acts in the direction, or coincides with GG', there will be no motion of rotation, as is obvious.

We may also farther observe, that if an impact be made on any point of the axis of a symmetrical body, or a solid of revolution, and that point be considered as the point of suspension,

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the wheel in order to raise a weight q , which is applied to the circumference of the axle, it is required to assign the quantity q , when the momentum generated in it in any given time shall be the greatest possible; the inertia of the wheel and axle not being considered.

Making, as before, $SD = n$, $SA = m$, the force which accelerates q is $f = \frac{nm\dot{p} - m^2\dot{q}}{n^2\dot{p} + m^2\dot{q}}$; therefore, if $l = 193$ inches, the velocity generated in q in the time t will be $2tl \times \frac{nm\dot{p} - m^2\dot{q}}{n^2\dot{p} + m^2\dot{q}}$, and the momentum generated in q will be $2tl \times \frac{nm\dot{p}q - m^2\dot{q}^2}{n^2\dot{p} + m^2\dot{q}}$; and as this is to be a maximum by the problem, its fluxion $= 0$, which being taken and reduced gives $q = \frac{\sqrt{(n^4\dot{p}^2 + n^3m\dot{p}^2) - n^2\dot{p}}}{m^2}$.

Therefore, if $SD : SA :: n : 1$, then $q = \dot{p} \sqrt{(n^4 + n^3) - n^2}$; if the radius of the axle equal the radius of the wheel, that is, $n = 1$; then the weight $q = \dot{p}(\sqrt{2} - 1)$, and consequently the weight moved must be about $\frac{1}{2.5}$ ths of the moving force.

But if we introduce the weight of the wheel, and call it w , r being the distance of the centre of gyration from the axis, then the momentum generated in the time t will be expressed by $2lt \times \frac{nm\dot{p}q - m^2\dot{q}^2}{wr^2 + n^2\dot{p} + m^2\dot{q}}$, which is the greatest possible $\frac{\sqrt{(n^4\dot{p}^2 + 2n^2r^2\dot{p}w + r^4w^2 + r^2nm\dot{p}w + n^2m\dot{p}^2) - (n^2\dot{p} + r^2w)}}{m^2}$ when $q = \frac{\sqrt{(n^4\dot{p}^2 + 2n^2r^2\dot{p}w + r^4w^2 + r^2nm\dot{p}w + n^2m\dot{p}^2) - (n^2\dot{p} + r^2w)}}{m^2}$

PROP. V.

Again, let $ABCH$ (*fig. 7.*) be a system of bodies moveable round a vertical axis, which passes through the common centre of gravity of the system. And suppose DEG to be a wheel, the axis of which is vertical, and coinciding with that of the system; let motion be communicated by means of a line going round this wheel, the string DP being stretched by a given weight p ; let it be required to assign the radius of the wheel EGD , so that the angular velocity communicated to the system in a given time may be the greatest possible. Let the weight of the system $= w$, and the distance of the centre of gyration from the axis of motion $= r$, the radius sought $SD = x$; then the motive force being p , the velocity generated in a given time in that descending weight will be proportional to $\frac{p x^2}{w r^2 + p x^2}$, and

the angular velocity generated in the same time as $\frac{p x}{w r^2 + p x^2}$,

which is to be a maximum by the conditions of the problem,

we have, therefore, $\frac{p w r^2 \dot{x} + p^2 x^2 \dot{x} - 2 p^2 x \dot{x}^2}{(w r^2 + p x^2)^2} = 0$,

whence $p w r^2 = p^2 x^2$, or $x = r \sqrt{\frac{w}{p}}$, the distance sought.

Supposing, therefore, the moving force $= \frac{1}{4}$ of the weight of the system w , we shall have $x = r \sqrt{\frac{w}{\frac{1}{4}w}} = 2r$; that is, the weight should be applied at a distance from the axis, equal to twice the distance of the centre of gyration, in

order to produce the greatest angular velocity in a given time.

PROP. VI.

In order to increase the action of a given moving force against a weight to be raised, or resistance to be overcome, a combination of two or more mechanic powers is frequently made use of. Thus, let p be a power applied by means of a line to the vertical wheel C , (*fig. 6.*), and suppose the circumference of the axle K to be in contact with the circumference of the wheel B , so that the circumference of the wheel B may always move equally fast with that of the axis which belongs to C ; let also the axle of B communicate motion to the vertical wheel A , to the axle of which a weight, q , is suspended, so as to act in opposition to p ; moreover, let lmn to 1 , be the sum of the ratios of the radius of each wheel to that of its axle; then if $plmn = q$, the two weights, p and q , will sustain each other in equilibrium; but if $plmn$ be greater than q , the equilibrium will be destroyed, and the weight q will ascend; and it is required to assign the space which, under those circumstances, will be described by q in a given time.

Let the radii of the wheel and axle A be in the ratio of l to 1 ; those of B as m to 1 ; and those of C as n to 1 ; the distance of the centre of gyration in A from the axis $= r$, the same of $B = r'$, and of $C = r''$; the weight of the wheel and axle $A = w$; that of $B = w'$; and that of $C = w''$.

Now the absolute moving force is p , but since q acts in opposition to it, it must be subtracted from p , in order to obtain the real motive force of the system. And since q would balance a weight $= \frac{q}{lmn}$, if applied at p , the force

which impels p on the whole will be $\frac{p l m n - q}{l m n}$. In the

next place, the inertia which resists the communication of motion to p must be ascertained. Now motion is communicated to the wheel A , from the circumference of the axle B , and the inertia of A , and of the weight q , which resists the communication of a force applied at $S = \frac{w r^2 + q}{l}$; in regard,

therefore, to the inertia of A and q , these may be supposed to be removed, and the equivalent mass $\frac{w r^2 + q}{l}$ collected into

the circumference of the wheel A , or of the axle B . And since motion is communicated to B , by the circumference of the axle C , the inertia of B , together with

the equivalent mass $\frac{w r^2 + q}{l}$ will be $\frac{r'^2 l^2 w' + w r^2 + q}{l^2 m^2}$.

In like manner, since motion is communicated to C by the weight p acting at D , the inertia which resists the communication of motion to D or p , will be

$$\frac{p n^2 + w'' r''^2}{n^2} + \frac{r'^2 l^2 w' + w r^2 + q}{l^2 m^2 n^2} = \frac{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w' + w r^2 + q}{l^2 m^2 n^2},$$

and the force which accelerates p in its descent from rest

$$= \frac{l m n (p l m n - q)}{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w' + w r^2 + q}, \text{ and}$$

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and that which accelerates q

$$= \frac{p l m n - q}{l^2 m^2 n^2 p + l^2 m^2 \omega'' r'' + r''^2 l \omega' + \omega r^2 + q};$$

if, therefore, we make this force = f , all the circumstances of the motion may be determined by the general formula

$$s = \frac{1}{2} l v = g f t^2 = \frac{v^2}{4 g f}; \text{ as before shewn. See a varie-}$$

ty of other propositions in Atwood's treatise on "Rotatory Motion."

In all the preceding propositions, the axis of the revolving system has been supposed fixed; but there are other cases by which rotatory motion may be produced, which ought to be attended to in this article; such as that which ensue from a body descending down an inclined plane, having a ribbon or cord wound about it, one end of which is fixed at the upper part of the plane, which, by preventing the body sliding freely, causes a rotatory motion. The same effect also follows from the friction of the body against the plane; and the same may be imagined when there is no plane, but the body is left to fall freely, except so far as the cord wound about it shall produce a rotatory motion in its descent. We shall not attempt the investigation of these cases, but merely state the results that have been obtained; and must refer the reader for the former to the several treatises on dynamics, enumerated under the articles DYNAMICS and MECHANICS.

Let a body (*fig. 8.*) have a cord wound about it, either at its circumference, or any other part, as C , having one end fixed at a point above, as at D ; then if the body be left to descend by the action of gravity, it will acquire a motion of rotation by the unwinding of the cord, and the space actually descended by the body in this case, will be to the space descended in the same time, when falling freely, as CG to CO ; O and G representing the centres of oscillation and gyration when the point of suspension is at C . And the weight of the body will be to the tension of the cord, as CO to CG . The same ratios have place when the body descends down an inclined plane; the forces which generate the motion being both decreased in the same ratio.

The force by which spheres, cylinders, &c. are caused to revolve as they move down an inclined plane (instead of sliding), is the adhesion of their surfaces, occasioned by their pressure against the plane. This pressure is part of the weight of the body; for this weight being resolved into its component parts, one in the direction of the plane, the other perpendicular to it, the latter is the force of the pressure; and which, while the same body rolls down, the plane will be expressed by the cosine of the plane's elevation. Hence, since the cosine decreases, will the arc or angle increase. After the angle of elevation arrives at a certain magnitude, the adhesion may become less than what is necessary to make the circumference of the body revolve fast enough; and in this case, it will proceed partly by sliding, and partly by rolling; but the angle at which this circumstance takes place, will evidently depend upon the degree of adhesion between the surfaces of the body and plane. This, however, will never happen, if the rotation is produced by the unwinding of a ribbon, and it is on this latter supposition that the following particular cases are deduced.

Let W be the weight of the body, s the space descended by a heavy body falling freely, or sliding freely down a plane; then the space S , described by rotation in the same time, by the following bodies, will be in these proportions.

1. A hollow cylinder or cylindrical surface $S = \frac{1}{2} s$; tension = $\frac{1}{2} W$.
2. A solid cylinder $S = \frac{2}{3} s$; tension = $\frac{1}{3} W$.
3. A spheric surface $S = \frac{1}{2} s$; tension = $\frac{2}{3} W$.
4. A solid sphere $S = \frac{8}{7} s$; tension = $\frac{2}{7} W$. See Gregory's Mechanics, vol. i.

ROTATION, *Spontaneous*, is that rotatory motion which a body acquires when acted upon by any external force in free space. And the *centre of spontaneous rotation* is that point which remains at rest the instant the body receives its impulsion, or it is that point about which the body begins to revolve.

The most general method of treating this subject is with reference to three rectangular co-ordinates, after the method of Lagrange and other modern French writers; but as that method is not commonly adopted by English mathematicians, we must necessarily either enter at great length into explanation, or run the risk of not being understood by many of our readers, on which account we shall here adopt a similar mode of investigation to that which we have followed in the preceding part of this article.

First, then, we may observe, that when a body, B , (*fig. 9.*) of any shape whatever, receives an impulse, the direction of which does not pass through the centre of gravity, and takes in consequence two motions, as we have stated in the early part of this article, it is evident, that for an instant of time we may consider it as having only one motion, namely, a motion of rotation about a point or fixed axis, C , which may be either within the body, or out of it, according to its shape, and the distance, GS , between the centre of gravity and the direction of impact. If, while the line GS is carried parallel to itself from GS to $G'S'$, we imagine that it revolves about the moveable point G , as the particles of the body have greater or less velocities, as they are more or less distant from G , it is manifest that there is upon SG a certain point, C , which will be found to describe from C' towards C an arc equal to GG' , which, during an evanescent instant, may be regarded as a right line; in that case the point C will have been carried as far backward by its motion of rotation, as it will have been advanced parallel to GG' by the velocity common to all the parts of the body; the point C has, therefore, during this instant, been actually at rest in C ; and may consequently be considered as a fixed point about which the body during such instant has a rotatory motion. This point is the centre of spontaneous rotation, and is the same as the centre of suspension, corresponding to the centre of percussion, the centre of percussion being the point where the body is struck.

Without entering into a minute demonstration of this property, we may convince ourselves of its truth, by considering that the action of a body against an immovable obstacle, in the centre of percussion, must have the same effect upon the body, as if that body had been at rest, and it had been struck by the obstacle; in which latter case, the centre of suspension would not be affected, and therefore it becomes the centre of spontaneous rotation. On which account it also follows, that the centre of spontaneous rotation is wholly independent of the magnitude of impact; but depends entirely on the distance that the force ϕS , or the result of all the forces, acts from the centre of gravity, G ; and consequently, when that force acts in the direction, or coincides with GG' , there will be no motion of rotation, as is obvious.

We may also farther observe, that if an impact be made on any point of the axis of a symmetrical body, or a solid of revolution, and that point be considered as the point of suspension,

ROTATION.

suspension, the corresponding centre of oscillation will be the centre of spontaneous rotation. This follows immediately from the properties of the centre of percussion and oscillation. (See CENTER.) To which we may also add, that since the force divided by the body acted upon, is a general expression for the velocity of the centre of gravity of that body; therefore the velocity of the centre of gravity of the body will be the same, whatever may be the direction of the impelling force; so that the permanency of the quantity of motion obtains the same in motions about a centre of spontaneous rotation, as in all other cases.

PROP. I.

When ϕS , (fig. 9.) the direction of impact, passes through the centre of the impelling body, the centre of gravity of the body struck, will move with a velocity equal to the product of the quantity of motion of the impelling body into the distance between the centre of gravity and spontaneous rotation, divided by the sum of the products of the impelling body into the distance of the point of impact from the centre of spontaneous rotation, and of the impelled body into the distance of the impelled body, into the distance between the centres of spontaneous rotation and of gravity.

Let the quantity of matter of the impinging body be b , its velocity v , or $bv = \phi$; and when the body B is struck in the direction ϕS , (in which the centre of the body b is always found), let the velocity of its centre of gravity be V , the centre of spontaneous rotation being at C . Then $CG : CS :: V : \text{the velocity of the point } S$, which is therefore $V \cdot \frac{CS}{CG}$; consequently, $v - V \cdot \frac{CS}{CG}$ = the velocity lost by b in the direction ϕS ; whence, by the third law of motion, $b \times \frac{v \cdot CG - V \cdot CS}{CG} = B \cdot V$, and by reduction, $V = \frac{b \cdot v \cdot CG}{B \cdot CG + b \cdot CS}$, as was to be demonstrated.

Hence, if the inertia of the striking body be evanescent, the velocity V will become $\frac{bv}{B} = \frac{\phi}{B}$, being the same as would be generated if the body b impinged directly on it with the velocity V .

PROP. II.

The inertia of the striking body being evanescent, the angular velocity of the system about the centre of gravity is equal to the momentum of the impelling body, divided by twice the product of the mass of the impelled body, and the distance CG , into the periphery of a circle whose diameter is unity.

If the fixed axis passed through C , the centre of gravity would describe a circle, whose radius is CG , with the velocity $\frac{bv}{B}$. But, in the present case, the motion of the

system will be compounded of the uniform rectilinear motion of the centre of gravity, in the direction $G'C$, perpendicular to CS , and the angular motion $\propto G'p = GC G'$, generated round the centre of gravity. And since the periphery of a circle, whose radius is CG , is $2\pi \cdot CG$

(π being $= 3.1416$), we have this analogy, $\frac{bv}{B} : 2\pi \cdot CG$

$$:: 1'' : \frac{2\pi \cdot B \cdot CG'}{bv}, \text{ the time of one revolution in seconds.}$$

Whence it follows, that the number of revolutions, or parts of a revolution, in a second, or the angular velocity U , will be $1 \div \frac{2\pi \cdot B \cdot CG}{bv} = \frac{bv}{2\pi \cdot B \cdot CG}$.

And since C is the centre of percussion to S as a centre of motion, if Q be the centre of gyration with respect to G as a centre of motion (that is, if Q be the principal centre of gyration), we shall have $GC \cdot GS = GQ^2$, or $CG = \frac{GQ^2}{GS}$. This value of GC being substituted for it in the preceding expression for the angular velocity, it becomes

$$U = \frac{b \cdot v \cdot GS}{2\pi \cdot B \cdot GQ^2}. \text{ It follows also from what is shewn above,}$$

that the centre of spontaneous rotation, during the motion of the system, describes the common cycloid. For the motion of any point in the system is compounded of the uniform rectilinear motion of the centre of gravity, and of the angular motion generated round that centre; but the velocity with which the centre of spontaneous rotation would move round the centre of gravity, if there only existed a rotatory motion in the system, would be equal to that with which the centre of gravity would move round it, if the centre C were fixed; consequently, since the centre C has both a rotatory and progressive motion, each of which is equal to that of the centre of gravity, it will describe a cycloid.

PROP. III.

In the body, or system B , (fig. 9.) to which, when quiescent, motion has been communicated by the impulse of a force, ϕ , without inertia, that is, rectilinear motion to the centre of gravity measured by the space V , which that centre would describe uniformly in any given time, and angular motions measured by the revolutions U , or parts of a revolution, which it would describe uniformly round G in the same time; then if the notations in the preceding propositions be retained, and Q be the principal centre of gyration, when the system revolves about its centre of gravity, the perpendicular distance from the centre of gravity, at which the impelling force must act so as to have generated these progressive and rotatory motions,

$$\text{will be } GS = \frac{2\pi \cdot U \cdot GQ^2}{V}.$$

Let ϕS be the direction of the impulse, and let ϕ be equal to the momentum of an evanescent body b , moving with the velocity V , B being the weight of the system; then the velocity communicated to the centre of gravity of

$$\text{the system, will, by the last proposition, be } = \frac{b \cdot v \cdot SG}{2\pi \cdot B \cdot GQ^2}.$$

But by the proposition, the velocity communicated to the centre of gravity of the system is V ; and the angular motion, that is, the number of revolutions, or parts of a revolution, described while the centre of gravity passes over the space V , is U ; so that from the conditions there arises this

$$\text{equation, } U = \frac{b \cdot v \cdot GS}{2\pi \cdot B \cdot GQ^2} = \frac{V \cdot GS}{2\pi \cdot GQ^2}, \text{ by putting } V$$

$$\text{for its equal } \frac{bv}{B}. \text{ Hence } GS = \frac{2\pi \cdot U \cdot GQ^2}{V}.$$

ROTATION.

If the body B be a sphere, whose radius is r , then $GQ^2 = \frac{2}{3}r^2$, and if u be the absolute velocity of rotation of an equator of the sphere, we have $U = \frac{u}{2\pi r}$; whence the preceding value of GS is transformed to this, $GS = \frac{2}{3}r \cdot \frac{u}{V}$.

This proposition may be applied to the double motion of the planets. The earth revolves about an axis passing through its centre of gravity, while, by a motion of translation, that centre is carried on in free space in an orbit nearly circular; and a similar kind of double motion has been discovered in several of the planets, and analogy leads us to believe it obtains in the others. Now, supposing the bodies of the planets to be spherical, as they are nearly, the use of this proposition at once appears. Having given, for instance, the magnitude of an impulse, with respect to the mass of the earth, and the direction $\angle S$, in which it was applied, at any given distance SG from the centre of gravity, the angular motion round G would be inferred; and conversely if the actual rotatory velocity of the earth's equator, and the velocity in its orbit, be ascertained, the distance GS from the centre, at which it may have received a single impulse $\angle S$ adequate to produce the double motion, may be readily found.

Thus, any point in the earth's equator passes over 25,020 miles by rotation in one sidereal day; and if the mean distance of the earth from the sun be 95 million miles, the earth will pass over nearly 596,904,000 miles by its orbital motion in a year, or in about 366 sidereal days; hence $596,904,000 \div 366 = 1,630,852$, will be equal to V in our theorem, while $25,020 = u$. Consequently, GS

$$= \frac{2}{3}r \cdot \frac{u}{V} = \frac{r}{163.2}$$

upon a quiescent sphere, and the direction of force should be at a distance SG from its centre of gravity of about $\frac{1}{163.2}$ part of its radius, the angular motion of that sphere, and the absolute motion of its centre, will have the same relation to each other, as those which actually obtain in the earth.

The time of the rotations of Mercury, Uranus, and the last new planets, are unknown; but for the following planets it is ascertained, so that, by the same theorem, we

obtain these values of GS ; viz. Mars, $\frac{r}{195}$; Jupiter,

$$\frac{r}{2.8125}; \text{ Saturn, } \frac{r}{2.588}; \text{ the Moon, } \frac{r}{555}.$$

We have not sufficient data for the sun; but the very circumstance of his having a rotation of $27^d 7^h 47^m$, makes it very probable that he, with all his attendant planets, is also moving forward in celestial space, perhaps round some centre of still more general and extensive gravitation; for the perfect opposition and equality of two forces, for giving a rotation without a progressive motion, has the odds against it of infinity to unity. This corroborates the conjectures of philosophers, and the observations of Herschel and other astronomers, who think that the solar system is approaching to that quarter of the heavens in which the constellation Aquilea is situated.

PROP. IV.

If a body revolves about an axis passing through its centre of gravity with the angular velocity U , while this axis is carried round another axis, also passing through its centre of gravity, with the angular velocity u , these two motions compose a motion of every particle of the body, round a

third axis lying in the plane of the other two, and inclined to each of the former axes in angles whose sines are inversely as the angular velocities round them; and the angular velocity V round this new axis, is to that about one of the primitive axes, as the sine of the inclination of the latter axis, to the sine of the inclination of the new axis to the other primitive axis.

Thus, if a body turns round an axis Aga , (*fig. 10.*) passing through its centre of gravity G , with the angular velocity U , while this axis is carried round another axis BGb , with the angular velocity u ; and if GD be taken to GE as U to u , (the points B and E being taken on that side of the centre where they are moving towards the same side of the figure,) and the line DE be drawn, the whole and every particle of the body will be in a state of rotation, about a third axis CGc parallel to DE , lying in the plane of the other two, and the angular velocity v about the axis CGc , will be to U as $DE : DG$; and to u as $DE : GE$. For let P be any particle of the body, and suppose a spherical surface, whose centre is G , to pass through P . Draw PR perpendicular to the plane of the figure; then is PR the common section of the circle of rotation IP ; round the axis Aa , and the circle KPk of rotation round the axis Bb . Let F and O be the centres of these circles of rotation, and Ii , and Kk , their diameters. Draw the radii PF , PO , and the tangents PM , PN ; these tangents are in the plane MPN , which touches the sphere in P , and the plane of the axis in the line MN , to which a line drawn from G , through R , would be perpendicular. Suppose PN to represent the velocity of rotation of the point P , about the axis Bb , while Pf represents its velocity of rotation about Aa , and complete the parallelogram $PNtf$; then is Pt the direction and velocity of the resultant of the composition of PN , Pf , and it is manifestly in the same plane as the constituent lines. Let perpendiculars fF , tT , be drawn to the plane of the axis, and the parallelogram $PNtf$ will be orthographically projected on that plane, its projection being also a parallelogram $RNTF$. Draw the diagonal RT . Then, since PR is perpendicular to the plane of the primitive axis, $PRtT$ is so likewise; and consequently the compound motion Pt is in the plane of a circle of revolution about some axis situated in the plane of the other two. Produce IR , and draw GC intersecting it perpendicularly in H ; and let LP be the circle of rotation, its diameter being $Ll = 2LH$; then is Pt a tangent, and perpendicular to PH , and it will meet IR in some point Q of the line MN . The particle P is in a state of rotation about the axis CGc ; its velocity is to the velocities round Aa , or Bb , as Pt to PF , or Pt to PN . Now PN the tangent is perpendicular to OP , and PR is perpendicular to ON ; therefore $OP : PN :: PR : RN$, or $RN = \frac{PN \cdot PR}{PO}$. But the velocity of P about the axis Bb , is $u \cdot OP$; whence $RN = \frac{u \cdot OP \cdot PR}{OP} = u \cdot PR$.

In like manner, $RF = U \cdot PR$; consequently $RF : RN :: U : u :: GD : GE$. But $NT : RN :: \sin. NRT : \sin. NTR :: \sin. GED : \sin. GDE$; hence $\sin. NRT : \sin. NTR :: \sin. GED : \sin. GDE$. Now, since NR is perpendicular to EG , and NT (parallel to FI) perpendicular to DG , we have $RNT = EGD$. Hence TR is perpendicular, and Cc parallel to ED . Also, since RN , RF , RT , are as the velocities u , U , v , about these different axes, and vary respectively, as EG , DG , DE , we have $v : U :: ED : GD : GE$; which was to be demonstrated.

Hence, if every particle of a body, whether solid or fluid, receives at the same time two separate impulses, the

one competent to the production of a motion of the particle round an axis with a certain angular velocity, and the other competent to the production of a rotatory motion about another axis with a certain velocity, the combined effect of all these impulsions, will be a motion of the whole system about a third axis, given in position, with an angular velocity which is also given; and this motion will obtain, without any separation or disunion of parts, except such as may be occasioned by the action of the centrifugal forces resulting from the rotation.

Hence, also, if a body be turning round any axis, and every particle, in one instant, get precisely such an impulse as is competent to produce a given angular velocity round another axis, the body will turn round a third axis given in position, with a given angular velocity.

Lastly, when a rigid body acquires a rotation about an axis, by an impulse on one part of it, and either at the same time, or afterwards, receive an impulse on any part which alone would have produced a certain rotation about another axis, the joint effect of these impulses will be a rotation about a third axis, in conformity with this proposition. For when a rigid body acquires a motion about an axis, not by the simultaneous impulse of the precisely competent force on each particle, but by an impulse on one part, there has been propagated to every particle, (by means of the cohesive forces,) an impulse precisely competent to the production of that motion which the particle actually acquires; and when a rigid body already turning round an axis *A a*, receives an impulse which makes it actually turn about another axis *C c*, there has been propagated in each particle a force precisely adequate to the production, not of the motion but of the *changes* of motion which takes place in that particle; that is, a force which, when compounded with the inherent force of its primitive motion, produces the new motion, that is, by the proposition a force which alone would have caused it to turn about a third axis *B b*, with a rotation making the other component of the actual rotation about *C c*.

This elegant theorem, the enunciation of which is due to P. Frisi, is very important, and gives a great extension to the doctrine of the composition of motion. It is of great use in many curious problems, and particularly that of the precession of the equinoxes. Those who wish for farther information on the subject of rotatory motion, may consult Gregory's "Mechanics," from which we have taken the three last propositions; Simpson's "Tracts;" Frisi's "Cosmographia;" "Philosophical Transactions," 1780; Landen's "Memoirs;" Atwood "On the Rotatory Motion of Bodies;" Lagrange's "Mécanique Analytique;" and a memoir "Sur le Mouvement de Rotation," by Français, Paris, 1813; in which latter work the subject is treated with all the generality it seems to admit of, and which method we should have adopted in this article, but for the reasons stated in the commencement of it, that is to say, the length to which we must have extended it, in order to have rendered it intelligible to the English reader.

ROTATION is also synonymous with ROLLING, which see.

ROTATION, in *Geometry*, the circumvolution of a surface round a line, called the *axis of rotation*.

By such rotation of planes, the figures of certain regular solids are formed or generated.

The method of cubing solids, generated by such rotation, is laid down by M. de Moivre, in his specimen of the use of the doctrine of fluxions. For the fluxions of such solids take the product of the fluxion of the abscissa, multiplied by the circular base, and suppose the ratio of a square to

the circle inscribed to be as $\frac{n}{1}$; the equation expressing the nature or property of any circle, whose diameter is *d*, is $y y = d x - x x$. Therefore $4 \frac{d x x - x^2 x}{n}$ is the fluxion of a portion of the sphere, and consequently the point itself $4 \frac{\frac{1}{2} x d x - \frac{1}{2} x^3}{n}$, and the circumscribed cylinder is $4 \frac{d x x - x^3}{n}$; therefore the portion of the sphere is to the circumscribed cylinder as $\frac{1}{2} d - \frac{1}{2} x$ to $d - x$. Phil. Transf. N^o 216.

For other instances of this kind, and a view of the application of the doctrine of fluxions, to find the contents of solid bodies, see SOLIDITY. See also CENTROBARYC Method.

ROTATION, *Revolution*, in *Astronomy*. See REVOLUTION.

ROTATION, *Diurnal*. See DIURNAL, and EARTH.

ROTATION, in *Anatomy*, the action of the muscoli rotatores; or the motion which they give to the parts they are fixed to.

There are two muscles, the great and the little obliquus, used to perform the rotation of the eye. The obturator internus and externus effect the rotation of the thighs.

Mr. Winslow has given an account of this, as well as of pronation, and other circulatory animal motions. See Mem. de l'Acad. des Sciences, 1729. See also EXTREMITIES.

ROTATION of *Crops*, in *Agriculture*, the several means of cropping lands of the arable kind in such a manner as to prevent their being exhausted as much as possible, and at the same time to preserve them free from weeds in the most complete and perfect mode. The proper alternation of different sorts of crops in this intention, is a matter of vast importance to the interests of agriculture, and in which immense improvements have been made in this and other countries within this last half century, but which is still far from any thing like perfection. See *Course of CROPS*.

In addition to what has been stated under the head referred to above, it may be observed, in this place, that the nature and state in which the manure is, when applied to the lands, should likewise be attended to in fixing the rotations of the crops, in order that the first and all the succeeding ones may be supported in the best and most effectual manner by the changes that are always taking place afterwards in such materials, when united and incorporated with the soils; and in this way, those parts of them which are not fitted to or suitable for one kind of crop, may be converted to the nourishment and support of the next, and so on in the same manner. Thus, where the turnip is the first crop in the rotation, and manure of the fresh dung kind is used, which directly affords it the necessary supply of soluble matter, while the heat which is generated in its decomposition assists the sprouting and growth of the seed, it should be succeeded by barley, or some other similar sort of grain crop, with suitable grass seeds, as the land will have been but little robbed of its fertility by the preceding turnip crop, and of course will plentifully supply the soluble portions of the gradually decomposing substance of the manure to that crop; while the grasses that remain on the land, which, in many cases, draw only a small portion of the matter of which they are composed from the earth, and in all probability take up the gypseous substance contained in the manure, which would be of little utility to other sorts of crops, and

and which, in consequence of their large supply of leaves, derive a considerable proportion of their nutriment from the surrounding atmosphere, when they become ultimately ploughed down into the ground, afford a considerable supply of manure to the succeeding wheat crop, by the gradual decay and decomposition of their roots and leaves, and besides, the woody fibrous parts of the farm-yard manure, which was at first applied, and which contains in its composition the phosphate of lime, as well as some other soluble parts which are of difficult reduction, are now broken down, and brought into a suitable state for the support of that crop.

After this deteriorating and exhausting crop has been taken from the ground, recourse must again be had to fresh manure, and the rotation be renewed.

And in the strong clayey soils, after the land has remained for two years in the state of grass, from the time of taking a well fresh dunged soil for barley crop, the leys may be ploughed down and sown with pea and bean crops; after which the pea and bean stubble may be turned in for a wheat crop; and in many cases this may be followed by crops of winter tares and winter barley to be eaten off upon the land in the spring season, previously to its being prepared by their being ploughed in, and other means for the sowing of turnips.

In these cases, the rotation may cease and begin again, either after taking the wheat crop, or those of the tares and winter barley, according as the circumstances of the different cases may be in respect to the land.

It may be noticed, that pea and bean crops, in all cases of this nature, appear to be very well suited to form and prepare the land for wheat crops, as is clearly ascertained, from their being alternately cultivated for many years together in some such situations. This may probably depend, in some measure, upon the small proportion of substance similar to that of albuminous matter which they contain, and afford, as well as upon the principles supplied by the decay of the bean roots in the ground, which may be capable of forming a part of the glutinous material in wheat crops.

In the business of cropping lands, it may likewise be necessary to have regard to the nature and manner in which the different sorts of plants are fed and supported, for though the composition of them in general may be very similar, the specific differences in the products of a number of them, as well as many other facts and circumstances, fully demonstrate that they must draw different sorts of matters from the earth or soil, and although it must be obvious that such vegetables as have the smallest supplies of leaves, will, in proportion, be the most exhausting to the earth or soil of its common nutrient materials, yet that particular sorts of plants, as they are principally supported by particular kinds of matters, will, where their produce is carried off the land, require peculiar principles of such natures to be supplied to the soil on which they grow.

The case of the potatoe, as well as some other plants, is highly illustrative of this point, as it is well known that it produces the most fully, and in the most luxuriant manner at first, while the ground or mould is in a fresh or virgin state, and just turned up from old ley or pasture; but that in the course of a few years it degenerates and declines, standing in need of a new fresh soil; and the nature of its production has a constant tendency to search for this, as the fibrous radicles afford new bulbs or roots at a considerable distance from the old plant.

Such grounds also as have been long cropped with some kinds of artificial grasses, as red clover, &c. frequently cease to yield good and full crops of them; they becoming,

in the language of the farmer, sick of, or tired with them; one principal and probable reason of which is, perhaps, the deficiency or absolute want of the peculiar sort of material which is necessary for their growth and support, as above, which in this instance is that of gypsum. This, therefore, may be proper to be regarded in determining the rotations in such cases.

A most remarkable case of this property and capability of particular plants to drain and exhaust the land of the particular principles and substances suited to their growth and support, is met with in the mushroom tribe, which are asserted never to appear in succession on the same point of ground.

In short, in every rotation of crops, it is of essential importance that every part of the land should, in its turn or succession, be made to contribute, as fully as it is capable, to the different plants as crops, by their being properly chosen and adapted in this respect.

In many instances of strong loamy land, great benefit may be derived from cropping with beans, which have been fully dunged for, after barley and clover, as the latter of the above crops and the manure will supply abundant support for the bean crop, and that crop, in its stubble and roots, afford an admirable preparation and supply of food for wheat, as already noticed; which may be properly and beneficially succeeded by tares, which again prepare the ground well by their being fed off on the land, or soiled for another crop of wheat. The rotation may then begin again.

Some think that all plants, the seeds of which yield oil, exhaust land in a very high degree. Thus cole, which is a sort of cabbage, especially when it perfects its seed, as well as the cabbage itself, which is believed by many to deteriorate the land greatly, is improper as a crop in preparation for wheat, though it is had recourse to in many districts, and thought highly of for that purpose. Great caution is constantly necessary in the rotations of cropping with such sorts of plants as crops.

In some cases of the lighter kinds of mixed soils, peas are found full as good a preparation for the wheat crop as beans, having the advantage of being off the land so much sooner. Pease or tares also prepare well for wheat, after ray-grass, on the stone-brash lands in many instances, when well cultivated.

That bean crops should always precede the wheat, and not follow it, as is too frequently the case in a number of districts, is sufficiently evident from the above remarks. Peas may sometimes be substituted in the place of the bean crop, with considerable propriety and utility.

It may be concluded on this most interesting subject, that of all the signs which denote the progress or perfection of the art of husbandry in any district or country, there is none which is more certain and correct than that of the rotations of the crops, which are pursued by the farmers in the management of their arable lands. Where there is no regular and appropriate change in the kinds of the crops, so as to suit them to the nature of their support, and the states and circumstances of the land, the system of farming must be in a wretched state indeed; but where the arable grounds are regularly preserved in a productive state, by suitable rotations well applied, not only the interest of the tenant is promoted, his judicious conduct rendered evident, and the advantage of the proprietor secured by the improvement which is effected, but the good of the community greatly increased, by the products of the earth being rendered so much more abundant for its use and support.

The practice of applying manure and cropping, so as to

draw out the strength of it, and that of the soil, as soon as it can be done, until the land is rendered quite barren and incapable of affording any more produce without some respite, is most miserable, and deserves the highest reprobation, though not uncommon.

It has been contended, that a well-selected rotation of crops is capable of doubling the support of the present population, and of vastly increasing the wealth and resources of the nation. Also, that having recourse to proper modes of cropping, may sometimes be highly beneficial in preventing the rust or mildew in wheat, as over-dunging immediately for such crops is found to be productive of the disease, while the application of it previously to some sort of smothering crop, such as rape or cole in strong lands, and potatoes on those that are light, is an almost effectual means of avoiding it. Some maintain that this disease seldom or ever takes place in wheat crops after rape or cole, and others assert the same to be nearly the case in them after potatoes. And that, as wheat after clover on light soils is liable to be affected in this way, it may occasionally be of importance to take it before that crop somewhat in this manner, potatoes, wheat, clover, barley.

ROTATION of Crops, in *Gardening*, the introduction of the most proper and suitable courses of crops, for the production of good garden vegetables of different kinds, and for the keeping of the ground in the richest and most proper condition for the cultivation and growth of them. This is equally important and necessary in the garden as in the field, but it cannot, by any means, be so fully and effectually accomplished in the former as in the latter, on account of the smallness of the usual limits of it, and the greatness of the number of different articles which are required to be raised and cultivated, as well as their more intimate relation to each other. See **CROPS**, *Course of*.

In addition to what has been said under the head above alluded to, it may be observed, that the management of this business may, in some measure, be effected by a suitable division and arrangement of the cultivated culinary vegetables into different classes, as crops for the purpose, as their natures, habits, methods of culture, and difference in duration and other circumstances may indicate. And by the application of the manure which is used in such states, kinds, and manners, as that it may go the farthest, be consumed to the greatest advantage in the raising of the different sorts of vegetables in succession, and produce them of the best and most healthy kinds.

Manure should be applied in the first instance only for those crops that are not injured in any way by it, but which receive great benefit from its use, and cannot be grown well without its being always employed in such states as are most favourable to them, according to their different natures, habits, and kinds, as the potatoe, cabbage, bean, celery, &c. When these crops have taken up the more gross parts, the finer and more delicate vegetables may succeed on the same land in their proper order, so as to consume the remaining parts of the manure in the most advantageous ways, both to the produce and the land.

On this principle, the rotations should obviously begin either with the potatoe, cabbage, bean, celery, or some other crop of a similar kind, well manured for; and be followed by those of the more delicate sorts, in their most suitable courses, so as not to be hurt in their growth or flavour. The use of grass feeds on well manured land may also sometimes be had recourse to by market gardeners, for laying down their lands in the view of refreshing them, and soon breaking them up again.

By proper attention to the different circumstances which

have been noticed above, and others of the same nature that may occur, different useful and advantageous rotations of crops may be introduced into garden culture, and the art be, in this way, very greatly improved.

ROTATOR, in *Anatomy*, a name given to the oblique muscles of the eye, called also, from the direction of the fibres, *circulares*, and from the effect of their action, *amatorii*. See **EYE**.

ROTCHET, in *Ichthyology*, an English name for the fish called by authors *cuculus*, and more frequently by us the red *gurnard*. See **TRIGLA Cuculus**.

ROTE, an old musical instrument, frequently mentioned in the French *Fabliaux*, and supposed to mean the *valle*, an instrument played with a wheel, instead of a bow.

ROTE, in *Geography*, a river of Germany, which runs into the Itch, two miles N. of Coburg.

ROTEBRO, a town of Sweden, in the province of Upland; 30 miles N.N.W. of Stockholm.

ROTELE, in *Ichthyology*, a name by which some call the *rutilus latior*, or *rubellus fluviatilis*, more frequently known by the name of the roach, a river-fish, with red belly-fins and tail. See **CYPRINUS Rutilus**.

ROTELSEE, in *Geography*, a town of the duchy of Wurzburg; 4 miles E. of Kitzingen.

ROTENBACH, a town of the archduchy of Austria; 9 miles N.W. of Schwanaftadt.

ROTENBERG, a town of Austria; 18 miles S.W. of Freyftatt.

ROTENBURG, a town of Switzerland, in the canton of Lucerne; 4 miles N. of Lucerne.—Also, a town of Wurtemberg, on the N. side of the Neckar, opposite to Ehingen; 21 miles S.W. of Stuttgart. N. lat. 48° 32'. E. long. 9° 3'.—Also, a town of Germany, in the county of Verden, on the Wumme; 12 miles N.N.E. of Verden. N. lat. 53° 8'. E. long. 9° 24'.—Also, a town of Germany, in the principality of Hesse, on the Fulda; 25 miles S.S.E. of Cassel. N. lat. 51° 1'. E. long. 9° 42'.—Also, a town of Brandenburg, in the New Mark, on the Oder; 12 miles E.S.E. of Crossen. N. lat. 52° 5'. E. long. 15° 30'.—Also, a town of the duchy of Baden; 14 miles E.S.E. of Spire. N. lat. 49° 15'. E. long. 8° 48'.—Also, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTENSTEIN, a town of the duchy of Carinthia; 10 miles S.W. of Saxenburg.

ROTGANS, LUKE, in *Biography*, an eminent Dutch poet, was born of a good family at Amsterdam, in 1645. His education led him to the cultivation of polite literature, which, for a time, he quitted to take up arms in defence of his native country, when invaded by the French in 1672. When his services were no longer required, he retired to a villa between Amsterdam and Utrecht, where he resumed with new vigour his favourite pursuits. When peace was concluded between France and Holland, he paid a visit to Paris. He died of the small-pox in 1710, in the 66th year of his age. He was author of a number of poems, highly esteemed in his own country. Of these, one is a "Life of William III.," in eight books. His other pieces are moral and miscellaneous, which, with two tragedies, were printed, in 1715, at Lewarden.

ROTH, in *Geography*, a town of Germany, in the principality of Anspach, at the union of the Roth and Rednitz, containing an asylum for those who have been guilty of manslaughter; and manufactures of stockings, Spanish lace, and stuffs; 15 miles S. of Nuremberg. N. lat. 49° 10'. E. long. 10° 59'.—Also, a river of Germany, formed from two springs, called the Ober and the Unter Roth, which unite

unite near Hilpoltstein, on the borders of Franconia; and after this union, it falls into the Rednitz, near the town of Roth.—Also, a river of Bavaria, which rises about 10 miles S. of Landeshut, and runs into the Inn, opposite to Scherding.—Also, a town of Germany, in the lordship of Limberg; 4 miles W.N.W. of Gaildorf.—Also, a river of Germany, which runs into the Danube, S.W. of Leipzig.

ROTH, *Ajeßl*, a town of Bohemia, in the circle of Prachatzitz; 4 miles N.E. of Pisek.

ROTH, *Haus*, a town of Silesia, in the principality of Neisse; 7 miles E.N.E. of Neisse.

ROTHA, a town of Saxony, in the circle of Leipzig; 6 miles S. of Leipzig. N. lat. $51^{\circ} 12'$. E. long. $12^{\circ} 21'$.

ROTHALS, in *Ornithology*, a name given by Gesner, and some others, to the pochard, or red-headed wigeon, the *anas ferina*; a bird distinguished from all others of the duck-kind, by having no variegation in its wings. See DUCK (FERINA).

ROTHARIS, in *Biography*, king and legislator of the Lombards, was duke of Brescia, at the time of the death of king Ariovald, in the year 638, who left a widow, named Gundeberg, but no male issue. The Lombards gave this lady the privilege of raising to the throne the person whom she should fix on for her husband, and her choice fell upon Rotharis, the subject of this article. For the sake of uniting himself with the queen, he repudiated his own wife, whom, however, he promised to maintain in the dignity of a queen. This engagement he did not long regard, but shut her up in an apartment of the palace of Pavia, where she remained five years; when, through the mediation of Clovis II., she was restored to her rank in society. Rotharis had scarcely ascended the throne, when he had to contend with all the power of certain nobles disaffected to his government, which, however, he quelled, and afterwards reigned with equal glory and prosperity at home and abroad. His predecessor had bound himself by a treaty with the exarch of the empire, to restrain himself within certain boundaries; but Rotharis did not conceive himself under any obligation to observe this treaty, and suddenly burst into the province of the Cottian Alps, which he reduced, and then made himself master of all the towns in the Venetian territories. The exarch, at the same time, made an incursion into the Lombard territory, which called away Rotharis from his conquests: an engagement ensued, in which the exarch was totally defeated, and obliged to save the relics of his army by speedy flight. Rotharis likewise penetrated into Liguria, and took Genoa, Albenga, and other maritime towns, which he pillaged and dismantled, carrying away the inhabitants as prisoners. Rotharis has the high merit of having first given to his nation a code of written laws. In the fifth year of his reign he summoned a general diet of his nobles at Pavia, where, with their consent, he enacted a number of laws, which were made public in an edict issued in 643, consisting of 386 articles. These, though they bear the stamp of a rude age and people, are accounted more judicious than the laws of some other barbaric people. It has been observed, that Rotharis was sufficiently enlightened not only to deride the superstition of witchcraft, but to protect the victims of that reputed crime from popular rage. He also practised religious toleration, and provided in all the cities of his kingdom a bishop for each of the two prevailing persuasions, the Arian and the Catholic. He died in 653, at the age of 47 years, having reigned more than 15 years. Univer. Hist.

ROTHBEIN, in *Ornithology*. See SCOLOPAX *Calidris*.

ROTHBURY, in *Geography*, a market-town and parish in Coquetdale ward, in the county of Northumberland, England, is situated $29\frac{1}{2}$ miles N. by W. from Newcastle, and $306\frac{1}{2}$ miles N.N.W. from London. In the oldest records, this place is called Robirie, Rathbury, and Routh-biry; and its name has by some been derived from the British word *Rhath*, signifying a cleared spot, or the Gaelic *Rath*, denoting a surety or place of safety; but it is more probable, on account of its Saxon termination, that it was so called from *roth*, *red*, from the ferruginous appearances around it, where iron mines and ochre abound. Soon after the Conquest, Rothbury, though itself only a member of the barony of Warkworth, appears to have been a large manor, including also those of Thropton and Snitter. King John enfeoffed the barons of Whalton, in this manor, for the payment of one knight's fee. It reverted to the crown, together with Warkworth, by settlement; and was, in 1330, granted to the Percies, and entailed upon their male posterity. The duke of Northumberland is now lord of the manor, but possesses very little freehold property in the town. No remarkable historical event has signalized this place. Previous to the union of England with Scotland, the inhabitants of Rothbury and its vicinity appear to have retained longer than most others the ferocity and lawlessness of the ancient race of borderers. The reformation was late in finding its way hither; and there are yet some traits remaining of the ruder ages, but which are gradually wearing away. A foot-ball play on Shrove-Tuesday, at which all the males above eight years old are required to attend, is one; and the continuance of the custom of bondage-service, in the forest of Rothbury, is another. But this last injurious usage having been abandoned upon the property of the duke of Northumberland, by his grace, it will soon, it is to be hoped, be only remembered by tradition.

According to the parliamentary returns in 1811, the town contains 133 houses, and 750 inhabitants: the parish, however, includes 27 other townships, which comprise 712 houses, and 3732 inhabitants.

Rothbury stands in a sequestered and romantic glen, on the north side of the river Coquet. The town is wide, airy, and tolerably well built, and is much frequented, during the summer season, by valetudinarians, to drink goats' whey; these animals abounding very much amongst the adjacent cliffs and rocks. There is a weekly market, but very indifferently supplied, and it has four fairs in the year. The church is a very ancient structure, dedicated to All-Saints, in the form of a cross, and contains a font of very curious workmanship, and several respectable monuments. Witton or Whitton tower, one of a line of towers, which, in the border-wars, extended from Hepple to Warkworth, a strong ancient building, with the arms of Unfranville on its west side, is now the rector's mansion. The living is worth about 1200*l. per annum*. Here is a bridge of three arches over the Coquet.

On the top of a hill, between this town and Thropton, is a circular intrenchment, with a double ditch and vallum, called Old Rothbury; and not far from it, in a sand-stone rock, is a large cave.

Rothbury-forest is about seven miles from east to west, and four miles from south to north. There is now very little wood upon it, and the whole land is nearly inclosed. It contains mines of lime-stone, coal, iron, and ochre; though, since the wood has disappeared, nothing but coal is dug, and that only to a very limited extent. In that part of the forest, north of the Coquet, and east of Rothbury, near the road leading from Alnwick, are Dibden-wells, the

waters

waters of which were formerly held in high estimation, and were much resorted to for the cure of scorbutic eruptions.

Halystone, a small village, about five miles west from Rothbury, is supposed to have been a place of some consequence in the time of the Saxons; for here, according to the venerable Bede, Paulinus baptized, in a copious adjoining spring, called our Lady's well, upwards of 3000 persons. There was also a priory of Benedictine nuns, a few vestiges of which are now in existence.

Harbottle castle, about a mile from Halystone, was once a formidable fortress, but is now in ruins. It was given by William the Conqueror to Robert de Unfranville, lord of Tours and Vian, by a general grant of the lordship of Redefdale, to hold, by defending that country for ever from wolves and enemies, by the same sword which the Conqueror wore when he entered Northumberland. In 1173 it was sacked by the Scots; but in 1296 it was besieged in vain by them. It is now the property of Thomas Clennels, esq., who has built a modern mansion near it.

At Hepple, on the Coquet, about five miles from Rothbury, there was also a strong castle, or tower, of which there are very few remains at present. Cartington castle, two miles north-west from Rothbury, was formerly the seat of the Ratcliffes: the part of it which remains is kept in good repair, and is very strongly built. Here is an asylum for six females of the Roman Catholic religion, who, from their secluded life, are usually called nuns. See Historical and Descriptive View of the County of Northumberland, &c., 2 vols. 8vo. 1811, drawn up by Mr. Mackenzie of Newcastle. Beauties of England, vol. vii. Northumberland, by the Rev. Mr. Hodgson.

ROTHEM, a river of Germany, which runs into the Danube, 5 miles above Ulm.

ROTHEMSEE, a lake of Germany, in the principality of Anspach; 6 miles E. of Gerhardsbron.

ROTHENBACH, a town of Germany, in the circle of the Lower Rhine; 30 miles E.S.E. of Francfort on the Maine.—Also, a town of Bavaria, in the bishopric of Bamberg; 2 miles E. of Forchheim.—Also, a town of Bavaria, in the territory of Nuremberg; 3 miles N.W. of Altorf.

ROTHENBURG, a town of Lusatia, on the river Neisse; 14 miles N. of Gorlitz. N. lat. $51^{\circ} 23'$. E. long. $15^{\circ} 2'$.—Also, a city of Bavaria, capital of a territory, and imperial, near the Tauber, situated on a mountain. The water of the Tauber supplies the town by means of a machine, which raises it to a part called the Klingenthorn, and from thence it falls down, forming three fountains in the town. The city is encompassed with ditches and walls, the latter being fortified with towers. It has five churches, and the inhabitants are Lutherans. This is a very ancient place, and it continued imperial till the year 1802, when it was assigned among the indemnities to the elector of Bavaria; 18 miles W. of Anspach. N. lat. $49^{\circ} 22'$. E. long. $10^{\circ} 14'$.—Also, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTHENFELS, a castle giving name to a county, called Konigsfegg Rothenfels, and ceded to Bavaria among the indemnities; one mile N.W. of Immerstadt.—Also, a town of the duchy of Wurzburg, on the Maine, the castle of which was demolished by the peasants in the year 1525; 16 miles W.N.W. of Wurzburg.

ROTHENSIRBEN, a town of Silesia, in the principality of Breslau; 8 miles S. of Breslau.

ROTHENSTEIN, a town with a castle, in the duchy of Wurzburg; 8 miles S.S.E. of Königshofen.

ROTHER, a river of England, in Suffex, which runs

into the sea at Rye.—Also, a river in the county of Derby, which runs into the Don, near Rotheram, in Yorkshire.

ROTHER-Beasts, a word used in old statutes, and still in the northern parts of England, for any horned beasts; as oxen, cows, steers, heifers, &c.

Whence *rother-soil*, in Herefordshire, is taken for the dung or soil of such cattle.

ROTHER-Nails, are such as have a very large head, and are used to fasten the rudder-irons in ships. See RUDDER.

ROTHERAM, in *Geography*, a market-town and parish in the upper division of the wapentake of Strafford and Tickhill, West-Riding of Yorkshire, England, is situated near the confluence of the rivers Rother and Don, at the distance of 45 miles S. by W. from the city of York, and 160 miles N.N.W. from London. It is described by Leland as "a meatly large town, with a fare collegiate church," which was founded by Thomas Scott, archbishop of York, and a native of Rotheram, in 1481, for a provost, five priests, a school-master in song, and six choristers, also a school-master in grammar, and another in writing. This establishment was dissolved by king Henry VIII. Camden calls Rotheram "a large footy market town," and not unaptly, for even at the present day it is far from meriting the appellation of handsome or agreeable. The streets are narrow and irregular; and the houses, which are mostly constructed of stone, have a dull and dingy appearance. A considerable trade in coals and other articles is carried on here, by means of the river Don. The market day for corn, cattle, and butcher's meat is on Monday, weekly; and on every alternate Monday is a fair for fat cattle, sheep, and pigs; there are also two annual fairs, on Whit Monday, and the first day of December. Both markets and fairs are well attended; indeed Rotheram is one of the two greatest marts in Yorkshire for fat cattle and sheep. The chief public buildings are the town-hall, the parish-church, and two meeting-houses, one for Independents and another for Methodists. The church, according to Burton, in his "Monasticon Eboracense," was erected in the reign of Edward IV. It is a handsome and spacious edifice, in the early pointed style, and consists of a nave, with two side aisles, a chancel, and a tower at the west end. Annexed to the church is a school-house, for the education of thirty poor children of the parish of Rotheram. The clergyman for the time is governor, and has the nomination of the children; but the trustees of the founder, Thomas Hollis, of London, esq. appoint the matter. This institution is managed under very excellent regulations, a copy of which is delivered to the parents of all children admitted to its benefits. In this town is likewise an academical institution, or college, for the education of Protestant dissenters. It is called "The Rotheram Independent Academy," because more immediately connected with the class of religionists called Independents. It was first opened in November, 1795, under the superintendance of the Rev. Dr. Williams, who presided as divinity tutor, and is designed for the education of young men proposing to become Independent clergymen. This academy is supported by voluntary contributions. The building appropriated to it was erected by the late Samuel Walker, esq. and is calculated for the convenient accommodation of sixteen students. The library contains above 1200 volumes, chiefly presented by patrons of the institution; and there is likewise a tolerable collection of philosophical apparatus. The term of study is four years, but the managers have a discretionary power to prolong it if they think proper.

According to the parliamentary returns of 1811, the town of Rotheram alone contained 731 houses, and 2950 inhabitants; and the rest of the parish, including the townships

ships of Brinsworth, Catliffe, Dalton, Orgreave, and Tinsley, 209 houses, and 986 inhabitants.

On the opposite side of the river from Rotherham is the township, or village, of Maxborough, where very extensive iron-works are carried on by Messrs. Walker. At these works cannon of the largest calibre are manufactured, as are also almost every kind of cast-iron articles, with many of wrought-iron, such as bar, sheet, slit, or rod iron. Tin plates, and steel of every description, are likewise made here in great quantities; and the iron bridges at Sunderland and Yarm were cast at these founderies. The coal, and the iron-stone for the blast-furnaces, are chiefly supplied from the mines on the estates of the earl of Effingham, and those of earl Fitzwilliam. These works were commenced, in 1746, by Mr. Samuel Walker, and his brothers Aaron and Jonathan, and have ever since been progressively increasing in extent and importance. In the Methodist meeting-house is a monument in memory of Mr. S. Walker; the epitaph was composed by the celebrated poet, the Rev. William Mason, who was one of his most intimate friends.

The environs of Rotherham are agreeable and picturesque. On an eminence to the eastward of the town stands an elegant mansion, belonging to the Walker family, which, in point of situation, can scarcely be excelled. Aldwark-Hall, the seat of J. S. Foljambe, esq. situated at the distance of four miles from Rotherham, is also remarkable for its fine situation. Near it is the village of Wickersley, noted for its manufacture of grindstones, of which about 5000, of various sizes, are slated to be formed annually, and sent to Sheffield. The other principal seats in the neighbourhood of Rotherham, besides those mentioned, are Thundercliffe Grange, the seat of the earl of Effingham, and Wentworth House, the princely residence of earl Fitzwilliam. The latter house consists of a centre and two wings, extending about 600 feet in length. Many of the apartments are most superb, especially the hall and gallery, the latter of which is supported by beautiful Ionic columns, having intervening niches filled with marble statues. Here, and in other parts of the house, are likewise many paintings; and among others the famous picture of lord Strafford and his secretary. Some fine antiques are preserved in a room called the museum. Wentworth-park comprises upwards of 1500 acres of ground, beautifully diversified with wood, water, and lawn, and is enriched by several ornamental buildings. Among these is a most magnificent mausoleum, erected by the present earl Fitzwilliam, in honour of his uncle, the late marquis of Rockingham. It is constructed of a very fine free-stone, and consists of three divisions; the first is a square Doric basement; the second of the same form, but of the Ionic order; and the third presents a cupola, supported by twelve columns of the same character. Within is an apartment rising into a dome, which rests upon eight pillars, encircling a white marble statue of the marquis in his robes of state, executed by Mr. Nollekens. Beauties of England and Wales, vol. xvi. by J. Bigland.

ROTHERAM Plough, in *Agriculture*, a particular sort of plough, which is found very useful, and much employed about the town of that name, in Yorkshire, as well as in many other places in the kingdom. See **Plough**.

ROTHERHITHE, in *Geography*, a village and parish in the eastern division of the hundred of Brixton, and county of Surrey, England, is situated on the south bank of the river Thames, at the distance of a mile and a half E. of London bridge. The parish is bounded on the N. and E. by that river, on the S. by the parishes of Bermondsey and Camberwell, on the W. by Horsley-Down, and on the S.E. by the parish of Deptford, in Kent. In this

parish are eleven dock-yards, at some of which ships are built for the service of the East India Company. The manor anciently belonged to the "Abbot of Graces," but was granted, in the reign of Richard II. to the priory of St. Magdalen, Bermondsey. After the suppression of monasteries, it continued annexed to the crown till the reign of Charles I. when it was granted to a gentleman of the name of White, and has since been possessed by various families. This manor has a court-leet and a court-baron. Rotherhithe, not being mentioned in Domesday-book, it seems probable that it was then only a hamlet to Bermondsey. The church was erected in 1715, instead of a former one, which had then become ruinous. It consists of a nave, chancel, and two side aisles, with a square tower, surmounted by a spire at the west end. The living is a rectory in the diocese of Winchester and deanery of Southwark. The only remarkable monument here is that of the Pelew prince, Lee Boo, who died of the small-pox December 29th, 1784, in the 20th year of his age. This young man was the son of Abba Thulle, king of the island of Goo-roo-raa, and came to England with captain Wilson, whose ship, the Antelope, was wrecked off that island 9th August, 1783, on which occasion the natives treated the crew with the utmost humanity and kindness. In this parish is a free-school, at which about 30 boys and 20 girls are clothed and educated.

According to the parliamentary returns of 1811, Rotherhithe parish contains 2719 houses, and 12,114 inhabitants. The History and Antiquities of the County of Surrey, by the Rev. Owen Manning, continued by William Bray, esq. folio, vol. i. Antiquities of Surrey, by N. Salmon, L. L. B. Lond. 8vo. 1736. Aubrey's Natural History and Antiquities of Surrey, vol. v. 8vo. Lond. 1719. Lysons's Environs of London, vol. i. 4to. Lond. 1796. And Supplement to the latter, 1813.

ROTHERSAY, or **ROSAY**, a royal borough-town and parish in the county and isle of Bute, Scotland, is situated on the bank of a fine bay, at the N.W. side of the island. The ancient Gaelic and patronimic name of this parish is Cilla-bhruid, which signifies the church dedicated to St. Broke. The town is yet called, in the Gaelic language, Bailea-Mhoide, or the town where the courts of justice are held. Rotherfay is undoubtedly of high antiquity; but it does not seem to have been constituted a royal borough till the year 1400, when king Robert III., who was then resident at the castle, raised it to that dignity. At that period it was a considerable town, but in succeeding years it declined greatly both in extent and population, as was apparent in the early part of the last century, by the number of ruinous houses, and foundations of others, which were then visible. About fifty years ago, indeed, it was reduced to the condition of a mean village, possessing only one decked vessel of inconsiderable burthen. Under the auspices of the late earl of Bute, however, the industry and emulation of the inhabitants began to revive, and the town has again advanced to a state of comparative prosperity and opulence. Even so early as 1790, the inhabitants had accumulated shipping to the amount of 4246 tons, and it is believed the estimate of tonnage is now nearly doubled. This change has been principally effected by the encouragement given to the herring-fisheries, in which the inhabitants of Rotherfay have about 100 small vessels employed annually; but in part it is likewise to be attributed to the establishment of some cotton-mills in the immediate vicinity. Rotherfay, as a royal borough, unites with Cambletown, Irvine, Inverary, and Ayr, in the election of a representative to the great council of the nation. It is the seat of the county courts of justice: and has the honour of giving the

waters of which were formerly held in high estimation, and were much resorted to for the cure of scorbutic eruptions.

Halystone, a small village, about five miles west from Rothbury, is supposed to have been a place of some consequence in the time of the Saxons; for here, according to the venerable Bede, Paulinus baptized, in a copious adjoining spring, called our Lady's well, upwards of 3000 persons. There was also a priory of Benedictine nuns, a few vestiges of which are now in existence.

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At Hepple, on the Coquet, about five miles from Rothbury, there was also a strong castle, or tower, of which there are very few remains at present. Cartington castle, two miles north-west from Rothbury, was formerly the seat of the Ratcliffes; the part of it which remains is kept in good repair, and is very strongly built. Here is an asylum for six females of the Roman Catholic religion, who, from their secluded life, are usually called nuns. See *Historical and Descriptive View of the County of Northumberland*, &c., 2 vols. 8vo. 1811, drawn up by Mr. Mackenzie of Newcastle. *Beauties of England*, vol. vii. Northumberland, by the Rev. Mr. Hodgson.

ROTHEM, a river of Germany, which runs into the Danube, 5 miles above Ulm.

ROTHEMSEE, a lake of Germany, in the principality of Anspach; 6 miles E. of Gerhardsbron.

ROTHENBACH, a town of Germany, in the circle of the Lower Rhine; 30 miles E.S.E. of Francfort on the Maine.—Also, a town of Bavaria, in the bishopric of Bamberg; 2 miles E. of Forchheim.—Also, a town of Bavaria, in the territory of Nuremberg; 3 miles N.W. of Altorf.

ROTHENBURG, a town of Lusatia, on the river Neisse; 14 miles N. of Gorlitz. N. lat. $51^{\circ} 23'$. E. long. $15^{\circ} 2'$.—Also, a city of Bavaria, capital of a territory, and imperial, near the Tauber, situated on a mountain. The water of the Tauber supplies the town by means of a machine, which raises it to a part called the Klingenturn, and from thence it falls down, forming three fountains in the town. The city is encompassed with ditches and walls, the latter being fortified with towers. It has five churches, and the inhabitants are Lutherans. This is a very ancient place, and it continued imperial till the year 1802, when it was assigned among the indemnities to the elector of Bavaria; 18 miles W. of Anspach. N. lat. $49^{\circ} 22'$. E. long. $10^{\circ} 14'$.—Also, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTHENFELS, a castle giving name to a county, called Konigsfegg Rothenfels, and ceded to Bavaria among the indemnities; one mile N.W. of Immerstadt.—Also, a town of the duchy of Wurzburg, on the Maine, the castle of which was demolished by the peasants in the year 1525; 16 miles W.N.W. of Wurzburg.

ROTHENSIRBEN, a town of Silesia, in the principality of Breslau; 8 miles S. of Breslau.

ROTHENSTEIN, a town with a castle, in the duchy of Wurzburg; 8 miles S.S.E. of Königshofen.

ROTHER, a river of England, in Suffex, which runs

into the sea at Rye.—Also, a river in the county of Derby, which runs into the Don, near Rotheram, in Yorkshire.

ROTHER-Beasts, a word used in old statutes, and still in the northern parts of England, for any horned beasts; as oxen, cows, steers, heifers, &c.

Whence *rother-soil*, in Herefordshire, is taken for the dung or soil of such cattle.

ROTHER-Nails, are such as have a very large head, and are used to fasten the rudder-irons in ships. See RUDDER.

ROTHERAM, in *Geography*, a market-town and parish in the upper division of the wapentake of Strafford and Tickhill, West-Riding of Yorkshire, England, is situated near the confluence of the rivers Rother and Don, at the distance of 45 miles S. by W. from the city of York, and 160 miles N.N.W. from London. It is described by Leland as "a meatly large town, with a fare collegiate church," which was founded by Thomas Scott, archbishop of York, and a native of Rotheram, in 1481, for a provost, five priests, a school-master in song, and six choristers, also a school-master in grammar, and another in writing. This establishment was dissolved by king Henry VIII. Camden calls Rotheram "a large footy market town," and not unaptly, for even at the present day it is far from meriting the appellation of handsome or agreeable. The streets are narrow and irregular; and the houses, which are mostly constructed of stone, have a dull and dingy appearance. A considerable trade in coals and other articles is carried on here, by means of the river Don. The market day for corn, cattle, and butcher's meat is on Monday, weekly; and on every alternate Monday is a fair for fat cattle, sheep, and pigs; there are also two annual fairs, on Whit Monday, and the first day of December. Both markets and fairs are well attended; indeed Rotheram is one of the two greatest marts in Yorkshire for fat cattle and sheep. The chief public buildings are the town-hall, the parish-church, and two meeting-houses, one for Independents and another for Methodists. The church, according to Burton, in his "*Monasticon Eboracense*," was erected in the reign of Edward IV. It is a handsome and spacious edifice, in the early pointed style, and consists of a nave, with two side aisles, a chancel, and a tower at the west end. Annexed to the church is a school-house, for the education of thirty poor children of the parish of Rotheram. The clergyman for the time is governor, and has the nomination of the children; but the trustees of the founder, Thomas Hollis, of London, esq. appoint the master. This institution is managed under very excellent regulations, a copy of which is delivered to the parents of all children admitted to its benefits. In this town is likewise an academical institution, or college, for the education of Protestant dissenters. It is called "The Rotheram Independent Academy," because more immediately connected with the class of religionists called Independents. It was first opened in November, 1795, under the superintendance of the Rev. Dr. Williams, who presided as divinity tutor, and is designed for the education of young men proposing to become Independent clergymen. This academy is supported by voluntary contributions. The building appropriated to it was erected by the late Samuel Walker, esq. and is calculated for the convenient accommodation of sixteen students. The library contains above 1200 volumes, chiefly presented by patrons of the institution; and there is likewise a tolerable collection of philosophical apparatus. The term of study is four years, but the managers have a discretionary power to prolong it if they think proper.

According to the parliamentary returns of 1811, the town of Rotheram alone contained 731 houses, and 2950 inhabitants; and the rest of the parish, including the townships

ships of Brinsworth, Catliffe, Dalton, Orgreave, and Tinsley, 209 houses, and 986 inhabitants.

On the opposite side of the river from Rotheram is the township, or village, of Maxborough, where very extensive iron-works are carried on by Messrs. Walker. At these works cannon of the largest calibre are manufactured, as are also almost every kind of cast-iron articles, with many of wrought-iron, such as bar, sheet, slit, or rod iron. Tin plates, and steel of every description, are likewise made here in great quantities; and the iron bridges at Sunderland and Yarm were cast at these founderies. The coal, and the iron-stone for the blast-furnaces, are chiefly supplied from the mines on the estates of the earl of Effingham, and those of earl Fitzwilliam. These works were commenced, in 1746, by Mr. Samuel Walker, and his brothers Aaron and Jonathan, and have ever since been progressively increasing in extent and importance. In the Methodist meeting-house is a monument in memory of Mr. S. Walker; the epitaph was composed by the celebrated poet, the Rev. William Mason, who was one of his most intimate friends.

The environs of Rotheram are agreeable and picturesque. On an eminence to the eastward of the town stands an elegant mansion, belonging to the Walker family, which, in point of situation, can scarcely be excelled. Aldwark-Hall, the seat of J. S. Foljambe, esq. situated at the distance of four miles from Rotheram, is also remarkable for its fine situation. Near it is the village of Wickersley, noted for its manufacture of grindstones, of which about 5000, of various sizes, are slated to be formed annually, and sent to Sheffield. The other principal seats in the neighbourhood of Rotheram, besides those mentioned, are Thundercliffe Grange, the seat of the earl of Effingham, and Wentworth House, the princely residence of earl Fitzwilliam. The latter house consists of a centre and two wings, extending about 600 feet in length. Many of the apartments are most superb, especially the hall and gallery, the latter of which is supported by beautiful Ionic columns, having intervening niches filled with marble statues. Here, and in other parts of the house, are likewise many paintings; and among others the famous picture of lord Strafford and his secretary. Some fine antiques are preserved in a room called the museum. Wentworth-park comprises upwards of 1500 acres of ground, beautifully diversified with wood, water, and lawn, and is enriched by several ornamental buildings. Among these is a most magnificent mausoleum, erected by the present earl Fitzwilliam, in honour of his uncle, the late marquis of Rockingham. It is constructed of a very fine free-stone, and consists of three divisions; the first is a square Doric basement; the second of the same form, but of the Ionic order; and the third presents a cupola, supported by twelve columns of the same character. Within is an apartment rising into a dome, which rests upon eight pillars, encircling a white marble statue of the marquis in his robes of state, executed by Mr. Nollekens. *Beauties of England and Wales*, vol. xvi. by J. Bigland.

ROTHERAM Plough, in *Agriculture*, a particular sort of plough, which is found very useful, and much employed about the town of that name, in Yorkshire, as well as in many other places in the kingdom. See **Plough**.

ROTHERHITHE, in *Geography*, a village and parish in the eastern division of the hundred of Brixton, and county of Surrey, England, is situated on the south bank of the river Thames, at the distance of a mile and a half E. of London bridge. The parish is bounded on the N. and E. by that river, on the S. by the parishes of Bermondsey and Camberwell, on the W. by Horsley-Down, and on the S.E. by the parish of Deptford, in Kent. In this

parish are eleven dock-yards, at some of which ships are built for the service of the East India Company. The manor anciently belonged to the "Abbot of Graces," but was granted, in the reign of Richard II. to the priory of St. Magdalen, Bermondsey. After the suppression of monasteries, it continued annexed to the crown till the reign of Charles I. when it was granted to a gentleman of the name of White, and has since been possessed by various families. This manor has a court-leet and a court-baron. Rotherhithe, not being mentioned in Domesday-book, it seems probable that it was then only a hamlet to Bermondsey. The church was erected in 1715, instead of a former one, which had then become ruinous. It consists of a nave, chancel, and two side aisles, with a square tower, surmounted by a spire at the west end. The living is a rectory in the diocese of Winchester and deanery of Southwark. The only remarkable monument here is that of the Pelew prince, Lee Boo, who died of the small-pox December 29th, 1784, in the 20th year of his age. This young man was the son of Abba Thulle, king of the island of Goo-roo-raa, and came to England with captain Wilson, whose ship, the *Antelope*, was wrecked off that island 9th August, 1783, on which occasion the natives treated the crew with the utmost humanity and kindness. In this parish is a free-school, at which about 30 boys and 20 girls are clothed and educated.

According to the parliamentary returns of 1811, Rotherhithe parish contains 2719 houses, and 12,114 inhabitants. *The History and Antiquities of the County of Surrey*, by the Rev. Owen Manning, continued by William Bray, esq. folio, vol. i. *Antiquities of Surrey*, by N. Salmon, L. L. B. Lond. 8vo. 1736. *Aubrey's Natural History and Antiquities of Surrey*, vol. v. 8vo. Lond. 1719. *Lysons's Environs of London*, vol. i. 4to. Lond. 1796. And *Supplement to the latter*, 1813.

ROTHERSAY, or **ROSAY**, a royal borough-town and parish in the county and isle of Bute, Scotland, is situated on the bank of a fine bay, at the N.W. side of the island. The ancient Gaelic and patronimic name of this parish is Cilla-bhruic, which signifies the church dedicated to St. Broke. The town is yet called, in the Gaelic language, Bailea-Mhoide, or the town where the courts of justice are held. Rothersay is undoubtedly of high antiquity; but it does not seem to have been constituted a royal borough till the year 1400, when king Robert III., who was then resident at the castle, raised it to that dignity. At that period it was a considerable town, but in succeeding years it declined greatly both in extent and population, as was apparent in the early part of the last century, by the number of ruinous houses, and foundations of others, which were then visible. About fifty years ago, indeed, it was reduced to the condition of a mean village, possessing only one decked vessel of inconsiderable burthen. Under the auspices of the late earl of Bute, however, the industry and emulation of the inhabitants began to revive, and the town has again advanced to a state of comparative prosperity and opulence. Even so early as 1790, the inhabitants had accumulated shipping to the amount of 4246 tons, and it is believed the estimate of tonnage is now nearly doubled. This change has been principally effected by the encouragement given to the herring-fisheries, in which the inhabitants of Rothersay have about 100 small vessels employed annually; but in part it is likewise to be attributed to the establishment of some cotton-mills in the immediate vicinity. Rothersay, as a royal borough, unites with Cambletown, Irvine, Inverary, and Ayr, in the election of a representative to the great council of the nation. It is the seat of the county courts of justice; and has the honour of giving the

title of a Scottish dukedom to the heir apparent of the British throne.

The castle of Rothefay is now a mere ruin, and is so completely enveloped with ivy, that only small portions of its walls are discernible to the eye. It was erected at different periods; part of it, forming the present entrance, by king Robert III., and the remainder at a much more remote date. The latter division is quite circular, and is strengthened by projecting round towers. This castle, in remote times, was the scene of several events of military note in Scottish history. According to Torfæus, Husbec, grandson of Somerled, was killed in an attack on a castle in Bute, most probably of this. In 1263, Haco, king of Norway, obtained forcible possession of it, and of the whole island; and in 1334 it was seized by Edward Baliol, because its then owner, the high steward of Scotland, was related to the Bruces, and was next heir to the throne. The year following, the island was invaded by the English under lord Darcy, and given up to plunder; which so exasperated the natives, that, in conjunction with those of Arran, they made an attack upon the castle soon after lord Darcy left it, and succeeded in regaining possession of it. Subsequent to this period it became a royal residence. King Robert II. and III. lived in it for a considerable time; and it would appear that much attention was bestowed on it, for in the reign of James V. we find that one of the articles of accusation exhibited against sir James Hamilton, was his not accounting for three thousand crowns destined for the "reform of the castle and palace of Rosay." In 1544, the earl of Lennox, assisted by the English, made himself master of this place; after which it became the principal residence of the Stuarts, ancestors of the present family of Bute, and continued so till the year 1685, when it was burnt by the duke of Argyle. The earl of Bute, however, yet ranks among his titles that of hereditary keeper of this palace.

The parish of Rothefay extends about ten miles in length, and from three to four in breadth. In the time of episcopacy, it was within the diocese of the Isles, and on the establishment of Presbyterianism, was included in the presbytery of Irvine, or Cuninghame, and the synod of Glasgow and Ayr. In 1639, however, it was disjoined from that presbytery and synod, and annexed to the presbytery of Denoon, and synod of Argyle, to which it continues united. According to the parliamentary census of 1811, this parish contained 702 houses, and 4970 inhabitants, of whom 3544 are resident within the borough. The Statistical Account of Scotland, by Sir John Sinclair, bart. vol. 1. 8vo. 1791. Pennant's Tour in Scotland, &c. 4to. vol. 1. Lond. 1776. Beauties of Scotland, vol. v. 8vo. 1808. Carlisle's Topographical Dictionary of Scotland, 2 vols. 4to. 1813.

ROTHERWASSER, a river of Saxony, which runs into the Elbe, about three miles below Pirna.

ROTHHAUSEN, a town of Germany, in the county of Henneberg; 8 miles S. of Meinungen.

ROTHHEIM, a town of the duchy of Wurzburg; 5 miles N.E. of Aub.

ROTHIA, in *Botany*, received its name from Schreber, in honour of Dr. Albert William Roth, a physician of the duchy of Bremen, born in 1755; whose *Flora Germanica*, though as yet unfinished, his *Catalea Botanica*, and various other works, have procured him a distinguished rank amongst European botanists.—Schreb. Gen. 531. Willd. Sp. Pl. v. 3. 1611. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 463. Lamarec Illustr. t. 667. Gært. t. 174. Roth, Catal. v. 1. 103.—Class and order, *Syngenesia Poly-*

gamia-aqualis. Nat. Ord. *Compositæ semisfoculose*, Linn. *Cichoraceæ*, Juss.

Gen. Ch. *Common Calyx* rounded, finely villous; of about seven equal, linear, acute scales. *Cor.* compound, imbricated, uniform, of numerous equal florets, all perfect, whose partial corolla is of one petal, ligulate, linear, abrupt, with five teeth. *Stam.* Filaments in each floret five, capillary, very short; anthers united into a cylindrical tube. *Pist.* Germen in each floret ovate; style thread-shaped, the length of the stamens; stigmas two, reflexed. *Peric.* none, the calyx closing over the seeds, which are solitary in each floret; those of the disk cylindrical, somewhat turbinate, striated, with sessile capillary down, feathery in its lower part; those of the radius cylindrical, striated, enveloped in scales of the receptacle, but destitute of down. *Recept.* flat; hairy in the disk; chaffy at the radius; the chaffy scales in several rows, linear, channelled, erect, rather acute, tubular at the base, the outermost equal in length to the calyx, the inner ones gradually shorter.

Ess. Ch. Receptacle hairy; chaffy in the circumference. Calyx of many equal scales. Seed-down hairy, sessile in the disk; none in the radius.

Obs. This genus, as every body observes, is very near *Andryala*, and we greatly fear ought not to be separated from it: Dr. Roth at first named it, after a friend of his. *Voigtia*, in Roemer and Usteris' Magazine, Fasc. 10. 17. What Gærtner has delineated and described for *Andryala*, v. 2. 361. t. 158, is now made a species of *Rothia*; to which circumstance however he does not advert at p. 371 of the same volume, where *Rothia* is described; neither does Roth, in his original description of this genus, seem to have had *Andryala* at all in his contemplation, or he would surely have contrasted their essential characters. In fact the genus of *Andryala* itself depends upon two of the species now called *Rothia*, with which the third indubitably accords. If *A. lanata* of Linnæus constituted a distinct genus, the name of *Andryala* might remain with it; but there is much reason to believe this plant ought to be referred to *Hieracium*, the hairiness of its receptacle being uncertain or variable. *A. cheiranthifolia* and *ragusina* have to precisely the habit of *Rothia*, that we can hardly allow them to be separated from it by any technical characters that we can discern. In this difficulty we shall here give the species of *Rothia* as we find them; only premising that, by any thing here said, we mean not to invalidate Dr. Roth's claim to be commemorated by some certain and immutable genus, to which his high botanical merits richly entitle him.

1. *R. andryaloides*. *Andryaline Rothia*. Gært. v. 2. 371. Roth, Catal. n. 1. Willd. n. 1. (*Voigtia tomentosa*; Roth in Roem. and Ust. Mag. fasc. 9. 17.)—Stem much branched from the very base. Leaves downy, ovato-lanceolate, clasping the stem, nearly entire.—Native of Spain. *Root* annual, branched, somewhat woody. *Stem* twelve or eighteen inches high, erect, brown, downy; its branches alternate, widely spreading. *Leaves* alternate, distant, recurved, rather wavy, downy, and hoary. *Flower-stalks* axillary and terminal, solitary, nearly twice as long as the leaves, naked, erect, single-flowered, extremely downy. *Braçtea* solitary under each flower, lanceolate, very downy, scarcely longer than the calyx, which is also downy and whitish; contracted and globose before the flower opens, but afterwards lax, consisting of from five to seven scales. *Corolla* yellow; the florets of the circumference purplish at the back. The outer row of scales of the receptacle is exactly like the calyx; the rest gradually smaller, downy on the outside. The flowers are open before noon only. The

The whole herb has straight, prominent, capitate hairs, intermixed with its downy pubescence. *Roth.*

2. *R. cheiranthifolia*. Stock-leaved Rothia. Roth. Catal. n. 2. Willd. n. 2. Ait. n. 2. (*Andryala sinuata*; Linn. Sp. Pl. 1137. *A. integrifolia* β; Syfl. Nat. ed. 12. v. 2. 525.)—Stem erect, corymbose. Leaves finely woolly, lanceolate, sinuated, or deeply toothed; the uppermost sessile, ovate, taper-pointed, entire. Native of Spain and the south of France, flowering there in May. It is marked in Hort. Kew. as a hardy annual, flowering in July and August. *Herb* milky, clothed with dense, white, woolly down, intermixed in the upper part with copious, prominent, capitate, tawny hairs, giving it a reddish hue, especially when old. *Stem* twelve or eighteen inches high; branched above, at first corymbose, then racemose. *Leaves* sessile, alternate, rather distant, obtuse; the lower ones about a finger's length, with short, triangular, distant teeth, and intermediate sinuses; the uppermost gradually smaller and entire. *Flower-stalks* naked, or with here and there a linear *bractea*. *Calyx* of from three to five scales. Outer scales of the *receptacle* like the calyx in structure, but rather longer, very downy at the back; inner ones shorter, smooth, and more membranous. *Corolla* of a golden yellow in every part.—We cannot help suspecting that what Dr. Roth thus describes as the outer scales of the *receptacle*, do in fact belong to the *calyx*, which appears to us composed of a row of very numerous equal woolly scales, surrounded with a few shorter external ones, as usual in many of this tribe.

3. *R. runcinata*. Hoary Rothia. Roth. Catal. n. 3. Willd. n. 3. Ait. n. 2. (*Andryala integrifolia*; Linn. Sp. Pl. 1136. Syfl. Nat. ed. 12. v. 2. 525. α. *Sonchus lanatus*; Dalech. Hist. v. 2. 1116.)—Stem erect, corymbose. Leaves downy; the lower ones oblong, runcinate; upper lanceolate, slightly toothed. Flower-stalks villous, glandular.—Native of the south of Europe. Biennial, twice as large as the foregoing, and varying much in luxuriance. The lower *leaves* are stalked. Whole *herb* clothed with fine, dense, velvet-like pubescence, very thick and woolly about the *calyx*, which is moreover beset with long golden hairs. Roth, very paradoxically, describes the *calyx* as consisting of only one or two leaflets, or scales, reckoning as scales of the *receptacle* what all the world, surely, would call a *calyx*. This, therefore, is only a difference of words, and appears still further to invalidate the distinction between *Rothia* and *Andryala*. These plants, in reality, require to be all examined and compared, in a living state, by some botanist accustomed to consider genera on a large scale, and who is particularly acquainted with syngenesious plants. We do not profess to be, at present, furnished with materials for the purpose.

ROTHIA, in *Geography*, a town of the island of St. Vincent, in York bay. N. lat. 13° 7'. W. long. 61° 16'.

ROTHLA, a town of Bavaria, in the territory of Rothenburg; 8 miles N. of Rothenburg.

ROTHMUNSTER, a princely abbey of Germany, on the Neckar, given as an indemnity, in the year 1802, to the prince of Hohenlohe; 2 miles S. of Rothweil.

ROTHWELL, a town of Wurtemberg, situated on the Neckar, being a very ancient imperial town, and which the emperors Charles IV. and Wenceslaus engaged to maintain as such. It is chiefly remarkable for its imperial tribunal, the first traces of which are to be found in the provincial court of Swabia, which seems to have originated in the time of the emperor Louis of Bavaria, and, till the middle of the 15th century, was sometimes called the provincial court of the emperor, and sometimes the imperial tribune of Roth-

weil. In the year 1802 it was given to the duke of Wurtemberg; 44 miles S.S.W. of Stuttgart. N. lat. 48° 7'. E. long. 8° 34'.

ROTHWELL, called also ROWELL, a town and parish in the hundred of Rothwell, and county of Northampton, England, is situated 4 miles N.W. by W. from the town of Kettering, and 78 miles N.W. by N. from London. This place is said to derive its name from two remarkable springs in the vicinity, the water of one of which is of a petrifying quality, and in the other are frequently found numerous small bones, conjectured to be those of frogs. Here was a small priory of Augustine nuns, dedicated to St. John Baptist, and which was probably founded by the Clare family, whose successors in the manor appear, upon record, as its patrons. Rothwell was formerly a considerable market-town, but the market has been long discontinued. The market-house is worthy of attention, from the style of the building. It was begun by sir Thomas Tresham, but never completed, owing to his death, which happened in the third year of James I. His son and successor, Francis Tresham, was providentially the instrument of the discovery of the gunpowder-plot, by sending a letter to lord Monteagle, who had married Mr. Tresham's sister, and thus led to the detection of the conspiracy.

In the church are several monumental memorials of the Tresham family, and others for different persons. Rothwell has an annual fair, held on Trinity-Monday. According to the returns to parliament in 1811, the parish contains 330 houses, and 1451 inhabitants.

In the hundred of Rothwell, at Great Oxendon, is a remarkable echo in the belfry of the church-tower. To a park standing at the distance of 673 feet, on the western part of the elevated ground on which the church is built, this echo returns distinctly thirteen syllables. An echo, but not to an equal extent, is obtainable from the top of an adjacent hill to the south; but scarcely any exists on the eastern or northern sides of the tower. But it is said, that the effect has lately been considerably diminished, by alterations which have been made in the belfry-windows.

Braybrooke church, between Oxendon and Rothwell, exhibits a very curious and highly decorated monument, erected for sir Nicholas Griffin, knight, who died in 1509. It displays an assemblage of pedestals, shields, crests, and other ornaments, very characteristic of the age of queen Elizabeth.

Kelmarsh-hall, on the one side of Rothwell, and Rushton-hall, on the other, are noble family mansions; and the latter in particular is very beautifully situated.

Robert Talbot, one of our early English antiquaries, who flourished about 1546, was a native of Thorpe Malton, a village between Rothwell and Kettering. He was the friend and associate of Leland, and both Camden and Burton seem to have made considerable use of his annotations on the Itinerary of Antoninus. History, &c. of Northamptonshire, by Bridges and Whalley, 2 vols. folio. A new edition, with large additions and corrections, of this work, is now preparing by Mr. George Baker of Northamptonshire.

ROTHWENDS DORF, a town of Saxony, in the margravate of Meissen; 3 miles S. of Pirna.

ROTIME, a town of Fez, near the Atlantic.

ROTKNUSSEL, in *Ornithology*, a name by which the Germans call the *gallinula melampus* of Gesner. It is a bird somewhat approaching to the snipe-kind; its back is brown, with a slight admixture of reddish, and some spots of a dusky colour; its wings are variegated with black and white, and

its beak and legs are black. It is common in many parts of Germany. See *GLAREOLA Nævia*.

ROTLESREUT, in *Geography*, a town of Germany, in the principality of Culmbach; 5 miles S.E. of Culmbach.

ROTMEINSDORF, a town of the duchy of Wurzburg; 2 miles E. of Ebern.

ROTNEBY, or RONNEBY, a sea-port town of Sweden, near a river of the same name, which runs into the Baltic. It has some trade, a harbour, medicinal springs, and several manufactures. The inhabitants are free of Carlscrona; 9 miles W. of it.

ROTOLO, an Egyptian weight of twelve ounces, each ounce consisting of twelve drachms, and each drachm of fifteen carats. See ROTTOLO.

ROTONDO, ROTUNDO, in *Architecture*, a popular term for any building that is round both within and without, whether it be a church, hall, a saloon, a vestibule, or the like.

The most celebrated rotondo of antiquity is the Pantheon at Rome, dedicated to Cybele, and all the gods, by Agrippa, son-in-law of Augustus; but since consecrated by pope Boniface IV. to the Virgin, and all the saints, under the title of Sta. Maria della Rotondo.

The chapel of the Elcurial, which is the burying-place of the kings of Spain, is also a rotondo; and, in imitation of that of Rome, is also called Pantheon.

ROTONDO, in *Geography*, a town of Naples, in the province of Basilicata; 6 miles S.S.E. of Turfi.

ROTRON, JOHN DE, in *Biography*, a French dramatic writer, was born, in 1609, of an ancient family at Dreux. He distinguished himself by a great facility in composing dramatic pieces, both in tragedy and comedy. In this line of literature he was so far superior to his predecessors, that he is denominated by Voltaire "the founder of the theatre." He was patronized by cardinal Richelieu, and Corneille used to call him his father. He was always a needy man, and wrote most of his pieces under the pressure of immediate necessity, so that he never had an opportunity of giving a finish to them. At length, however, he was enabled to purchase the office of lieutenant-particular of his native place, where he constantly resided. A pestilential disorder breaking out, and making great ravages at Dreux, he was intreated by his brother to quit that town, and come to Paris; but his reply shewed that he was resolved to remain on the spot where his duty placed him. In one of his letters he said, "At the moment I am writing, the bell is tolling for the twenty-second death this day: my turn will come when it pleases God." He died in a very short time after this, in the 41st year of his age. Of his numerous plays, the best are "Chofroes," "Antigone," and "Wenceslaus." The latter was revived by Marmontel, and Voltaire speaks of several parts of it in the highest terms.

ROTSCHOWALM, in *Geography*, a sea-port of Russia, in the government of Viborg, situated on the north coast of the gulf of Finland, on the borders of Sweden, formed by several islands, fortified with forts and redoubts.

ROTSCHWENTZEL, in *Ornithology*, the name of a bird described by Gesner, and some other authors, and seeming to be the same with our *ruicilla*, or red-start. See *MOTACILLA Phœnicurus*.

ROTSIMPA, in *Ichthyology*, a name given by the Swedes to a species of cottus, called by Jonston and Schonveldt *scorpius marintus*. It is different from the scorpena of the generality of writers, and is of the cottus kind. It is distinguished by Artedi under the name of the *smooth cottus*,

with many thorns upon the head, and with the upper jaw somewhat longer than the under one. See *COTTUS Scorpius*.

ROTSUSTA, in *Geography*, a river of Walachia, which runs into the Podrus, 5 miles N.W. of Strehaja.

ROTTBOLLIA, in *Botany*, so named by the younger Linnæus, after Dr. Christian Friis Rottböll, Professor of Botany, as well as of Anatomy, in the university of Copenhagen, who died in 1797, aged 70. He is particularly distinguished by his descriptions and figures of new or rare plants, a thin folio, published in 1773, with 21 very neat and accurate plates. As this volume contains only plants of the order of *Calamaria*, it is usually quoted *Rottböll's Gramina*, or *Grasses*, though that appellation is not precisely correct. The same writer has published several botanical treatises besides, either in the form of university essays, or in the *Medical Transactions of Copenhagen*.—Linn. fil. Nov. Graminum Genera, 23, with a figure. Suppl. 13. Schreb. 721. Willd. Sp. Pl. v. 1. 463. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 175. Sm. Fl. Brit. 151. Prodr. Fl. Græc. Sibth. v. 1. 71. Brown Prodr. Nov. Holl. v. 1. 206. Juss. 31. Lamarck Illustr. t. 48.—Class and order, *Triandria Digynia*. Nat. Ord. *Gramina*, Linn. Juss.

Gen. Ch. *Common Receptacle* cylindrical, thread-shaped, jointed, with an oblong excavation on one or two sides of each joint, at the bottom. *Cal.* Glume lateral, fixed, simple or divided, closing the hollows of each joint, and containing one or two florets. *Cor.* Glume concealed by the calyx, of one or two membranous unawned valves. *Stam.* (in each floret) Filaments three, capillary; anthers linear, forked at each end, hanging out of the floret. *Pist.* (in one floret only of each joint) Germs oblong, abrupt, convex at one side, concave at the other; styles two, capillary; stigmas feathery, prominent. *Peric.* none, except the hollow of each finally separated joint, closed with the calyx. *Seed* solitary, the shape of the germs.

Eff. Ch. Calyx fixed, nearly single-flowered, simple or divided. Flowers alternate, on a jointed common stalk.

Obs. The genera which our learned friend Mr. Brown has separated from *Rottbollia* will be found mentioned under the articles HEMARTHRIA, LEPTURUS, OPHIURUS, and MICROCHLOA. The last we conceive to be the most distinct. We shall here take the genus *Rottbollia* as it stands in Linnæus and Willdenow, and have drawn up the generic character accordingly.

1. *R. incurvata*. Sea Hard-grass. Linn. Suppl. 114. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Fl. Græc. t. 91. Engl. Bot. t. 760. Knapp. Gram. t. 103. Fl. Dan. t. 938. (*Aegilops incurvata*; Linn. Sp. Pl. 1490.)—Spike round, awl-shaped, incurved. Glume of the calyx awl-shaped, close-pressed, deeply divided. Stipula very short, abrupt.—Native of the sandy sea-coasts of Europe. A small annual grass, flowering in August. The root consists of numerous long capillary fibres. Stems numerous, decumbent at the base, from three inches to a foot long, branched, jointed, leafy, round, slender, very smooth. Leaves linear, acute, narrow, rough on the upper surface and edges; their sheaths a little swelling, smooth, striated, shorter than the leaves, each crowned with a short blunt stipula. Spikes solitary at the end of each branch, rigid, long and slender, more or less curved. Calyx spreading whilst in full bloom. Florets solitary, perfect, all fertile.

2. *R. filiformis*. Thread-shaped Hard-grass. Roth. Catal. v. 1. 21. Nardus gangitits; Herb. Linn. (*Gramen junceum nodosum minimum capillare*; Barel. Ic. t. 117. f. 1.)—Spike thread-shaped, slightly compressed, erect.

ROTTBOLLIA.

erect. Glume of the calyx sword-shaped, deeply divided. Stipula elongated, lanceolate, obtuse, jagged.—Native of the south of Europe. Much more slender than the former, with a purplish stem, and smaller, rougher, channelled leaves. Florets more crowded together. This is certainly what Linnæus had in his herbarium for *Nardus gangitis*, when he described that plant in his Sp. Pl. ed. 1. 53, though the mark of a cross indicates that he had some doubts concerning it. Those doubts arose from the synonyms quoted in the Sp. Pl. which have nothing to do with the grasses before us. Their history may be found in Transf. of Linn. Soc. v. 1. 116.

3. *R. cylindrica*. Stout Hard-grass. Willd. n. 3. (Gramen loliaceum junceum majus; Barel. Ic. t. 5. G. loliaceum, spicis articulosis erectis; Mont. Gram. 43. f. 28. G. myuros, &c.; Bocc. Mus. 70. t. 59.)—Spike round, awl-shaped, slightly curved. Glume of the calyx undivided.—Native of the south of Europe. This appears to be of a stouter habit than even the first species, but we know nothing of it, except from the authors quoted. Monti says it differs from *R. incurvata* in having the glume of the calyx undivided.

4. *R. Thomaæ*. Mouse-tail Hard-grass. Willd. n. 4. Roxb. Corom. v. 2. 17. t. 132. (*R. pilosa*; Willd. n. 7. *Nardus Thomaæ*; Linn. Suppl. 105.)—Spike linear, compressed, nearly straight. Florets imbricated, in two rows.—Gathered by Koenig on the mountain of St. Thomas in Tranquebar. A small, glaucous, densely tufted grass, whose leaves are fringed with long hairs. Spikes solitary on each stem; their common stalk zigzag at each of the flat sides of the spike, but not perceptibly jointed. Florets imbricated closely, in an alternate order, along each edge of the spike. Glume of the calyx keeled, undivided, a little recurved at the point.

5. *R. repens*. Creeping Hard-grass. Forst. Prodr. 9. Willd. n. 5. (*Lepturus repens*; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike round, awl-shaped. Glume of the calyx undivided. Sheath of the leaves bearded at the top. Root creeping.—Native of the South Sea islands, and the tropical part of New Holland, on sandy sea-shores. Branches ascending. Leaves imperfectly two-ranked, straight, linear, rather involute; their sheaths bearded, with scarcely any visible stipula. Spike thread-shaped, acute, beardless; its joints separable. Glumes of the calyx pointed, longer than their corresponding joints. Brown.

6. *R. levis*. Smooth Hard-grass. Retz. Obf. fasc. 3. 11. Willd. n. 6.—Spike cylindrical. Joints two-flowered. Glumes of the calyx oblong, obtuse, undivided, very smooth, the length of the joint.—Native of Tranquebar. Roots apparently perennial, with strong fibres. Stems ascending, a foot or more in height, scarcely branched, leafy. Leaves densely tufted at the root, short, broad and flat, smooth; their sheaths densely bearded, without any membranous stipula: stem-leaves short, distant, with long sheaths. Spikes terminal, solitary, erect, three or four inches long, pale, smooth, each joint furrowed, with two lateral, not quite opposite, hollows. Glume of the calyx very smooth and even like ivory, with an obtuse, oblique, greenish point, and a little furrowed at the very base.

7. *R. compressa*. Flat-spiked Hard-grass. Linn. Suppl. 114. Willd. n. 8. Retz. Obf. fasc. 3. 12. Roxb. Corom. v. 2. 30. t. 156. (*Hemarthria compressa*; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike compressed, awl-shaped, incompletely jointed. Joints two-flowered. Outer glume of the calyx undivided; the points of all the glumes

straight.—Native of the East Indies, China, and New South Wales, about ponds. Stems compressed, leafy. Leaves smooth, naked, with compressed sheaths. A stalked tuft of spikes, accompanied by a leafy involucre, springs from the upper sheaths. Calyx of two valves; one of them internal.

8. *R. uncinata*. Hooked Hard-grass. (*Hemarthria uncinata*; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike compressed, awl-shaped, incompletely jointed. Joints two-flowered. Outer glume of the calyx undivided; the point of the inner one hooked.—Gathered by Mr. Brown in the island of Van Diemen.

9. *R. hirsuta*. Great Hairy-spiked Hard-grass. Vahl. Symb. fasc. 1. 11. Willd. n. 9. (*Triticum ægiloides*; Forsk. Ægypt-Arab. 26.)—Spike awl-shaped, very hairy. Calyx of the perfect florets spreading; of the male ones close-pressed. Stem angular in the upper part.—Native of Egypt; not unfrequent about Alexandria, flowering in March. We have specimens from Dr. Delile, who informs us that a figure of this grass is destined for the great work, descriptive of Egypt, part of which has already appeared at Paris. The stem is branched, rigid, about two feet high, leafy, jointed, the upper joints angular, being flattened at one side, striated, a little roughish. Leaves involute, rigid; their sheaths smooth, strongly furrowed, crowned with a tuft of hairs; the upper ones somewhat inflated. Spike solitary, partly enveloped in the uppermost sheath, about three inches long, rather compressed. Glumes lanceolate, taper-pointed, emarginate, clothed externally with copious, long, white hairs.

10. *R. Cymbachne*. Boat-valved Hard-grass. Willd. n. 10. (*Cymbachne ciliata*; Retz. Obf. fasc. 6. 36.)—Spikes in pairs, flowering at one side only. Calyx of the perfect florets with an inner, boat-like glume. Leaves fringed at the base.—Found by Koenig in Bengal. A slender grass, a foot high, with several, simple or branched, stems; the latter bearing one leaf, the others leafless. Leaves short, thin, fringed at the margin, above the sheath, with long, white, separate hairs; sheath abrupt, pale-brown at the summit, fringed. Spikes terminal, in pairs, linear, an inch and a half long, some consisting of perfect, the others of female, flowers. Common stalk linear, membranous, flat at the back, with three longitudinal furrows; zigzag, with alternate hollows, in front. Calyx of the perfect flowers of two valves, single-flowered, both of them parallel and exposed to view, close-pressed to the common stalk, or receptacle; the outermost valve linear, obtuse, fringed at the back; innermost half-ovate, acute, boat-shaped, greatly compressed, striated, coloured, fringed at the back, inclosing the corolla. Anthers and stigmas black. Female flowers with a single-valved, close-pressed, ovate, fringed calyx, slightly cloven at the point. Corolla and stamens wanting. Stigmas longer than in the former. Retzius.

11. *R. Coelorachis*. Hollow-stalked Hard-grass. Forst. Prodr. 9. Willd. n. 11.—“Spike round, flowering at one side only. Florets in pairs; one of them stalked. Calyx of two valves.”—Native of the island of Tanna. We have seen no specimen. Mr. Brown mentions this as one of the few certain *Rottböllia*, according to his own strict limitation of the genus. We presume, from the name, that Forster had originally considered this plant as constituting a distinct genus; and that he named it in allusion to the hollows of the common receptacle; which, nevertheless, are proper to *Rottböllia*.

12. *R. dimidiata*. Half-spiked Hard-grass. Linn. Suppl. 114, excluding the synonym. Willd. n. 12.—Spikes compressed,

compressed, flowering at one side; striated with undulating lines at the other. Flowers two to each joint, one rather above the other, with short abrupt scales at their base.—Native of the East Indies, and of the Brasils, in sandy ground. Whether Thunberg's Cape plant be the same, we are not certain, there being some confusion between our *Rottböllia* and the *Panicum dimidiatum* of Linnæus; which latter we have never seen, but Koenig and Retzius insisted on their being two very different things. *R. dimidiata* is a stout, branched, smooth grass, with very broad, obtuse, spreading leaves, whose sheaths, like the stem, are very much compressed. Spikes several, on solitary or clustered, simple, axillary and terminal, stalks, two or three inches long, about their own length. Each spike is tapering, stout, jointed, curiously striated at the back, with alternately curved and recurved lines; bearing, at the opposite side, on each joint, two angular flowers, one elevated above the other, and each accompanied by a short scale at the base. The structure of the flowers we have not been able to examine.

13. *R. exaltata*. Tall Hard-grass. Linn. Suppl. 114. Willd. n. 13. Brown Prodr. n. 1. Roxb. Corom. v. 2. 30. t. 157. (*Stegofia cochinchinensis*; Loureir. Cochinch. 51, on the authority of a specimen from the author, in the Banksian herbarium.)—Spike round, flowering on every side, beardless. Glumes obtuse, rough as well as the common receptacle. Leaves and their sheaths hairy.—Native of the East Indies, and of Cochinchina. A tall grass, with a solid stem. Sheaths of the leaves furrowed, besprinkled with elevated points, each bearing a bristle. Spikes solitary, lateral, four or five inches long.

14. *R. formosa*. Silky Hard-grass. Brown n. 2.—“Spike round, flowering on every side; its joints, as well as the outer glumes of the perfect flowers, silky; those of the neuter ones smoothish and empty.”—Gathered by Mr. Brown in the tropical part of New Holland.

15. *R. perforata*. Perforated Hard-grass. Roxb. Corom. v. 2. 43. t. 182.—Spike round, flowering on every side, beardless. Glumes obtuse, smooth. Common receptacle perforated in each joint, between the opposite flowers. Leaves smooth. Sheaths woolly at their summit.—Native of low rich pasture-ground on the coast of Coromandel, but rare. Root fibrous. Stems several, about two feet high, erect, round, jointed, solid, slender, smooth, leafy. Leaves small, narrow, smooth, except at their edges. Sheaths very woolly at the summit within, which wooliness extends a little way up the leaf. Spikes solitary, stalked, terminal and axillary, slender, erect, four or five inches long. Flowers two to each of the lower joints, opposite; one to each of the upper ones; sometimes all perfect; sometimes many of them have stamens only. This, like most of the other species, is a coarse grass, not eaten by cattle.

16. *R. corymbosa*. Corymbose Hard-grass. Linn. Suppl. 114. Willd. n. 14. Roxb. Corom. v. 2. 42. t. 181. (*R. punctata*; Retz. Obf. fasc. 3. 12. *Ægilops exaltata*; Linn. Mant. 575. Retz. Obf. fasc. 2. 27. *Ophiurus corymbosa*; Brown Prodr. Nov. Holl. v. 1. 207.)—Spikes aggregate, thread-shaped, smooth. Glume of the calyx ovate, obtuse, undivided, with reticulated depressions.—Native of ditches on the coast of Malabar, as well as of the tropical region of New Holland. The stem is tall, round, leafy, finely striated, smooth. Leaves flat, with long smooth sheaths. Spikes purplish, many together, slender, in tufts, on simple or compound, smooth, cylindrical stalks, from the sheaths of the short uppermost leaves. Glume of each calyx the length of the joint, a little spreading, at

least in the dry specimen, and curiously reticulated at the outside.

17. *R. digitata*. Finger-spiked Hard-grass. Sm. Fl. Græc. Sibth. v. 1. 73. t. 92.—Spikes terminal, clustered. Receptacle angular, rough. Flowers partly stalked. Glumes keeled, taper-pointed. Sheaths of the leaves hairy. Gathered by Dr. Sibthorp in the low country about the base of the Bithynian Olympus. This is a large grass, three feet high, with all the appearance of being perennial. Stem branched, leafy, round, smooth. Leaves a foot or more in length, moderately spreading, flat, acute, rather glaucous, with a pale central rib; their upper side rough, and often hairy; their sheaths long, close, ribbed, dotted and hairy. Stipula of a few short hairs. Spikes several, from nine to twelve inches long, erect, forming an oblong tuft at the top of the stem; rarely solitary. Receptacle, or common stalk, of each zigzag, angular, rough-edged, every joint accompanied at its concave smooth side by two flowers, one sessile, the other on a stout, angular, club-like stalk, half the length of the corresponding joint. Calyx of two unequal, awl-shaped, rough-keeled valves; that of the stalked flower containing two florets, one of which is male; that of the sessile flower only a solitary floret, sometimes perfect, sometimes furnished merely with stamens. Corolla in all the florets of two pellucid white glumes, shorter than the calyx. Anthers and stigmas yellow.

18. *R. muricata*. Prickly Hard-grass. Retz. Obf. fasc. 3. 12. Willd. n. 15. (*Ægilops muricata*; ib. fasc. 2. 27.)—“Spikes round, several together, on long stalks. Calyx fringed with prickles; the neuter ones cloven.”—Found in the East Indies, by Koenig.—Stems angular, leafy. Sheaths of the leaves fringed. Spikes axillary, two or three together, thicker than in *R. exaltata*, each on a long stalk. Calyx slightly downy, fringed with marginal prickles.

19. *R. sanguinea*. Red-flowered Hard-grass. Retz. Obf. fasc. 3. 25. Willd. n. 16.—Spikes axillary, alternate, stalked, approximated. Corolla awned at the base.—Native of China.—Stem semi-cylindrical, jointed, leafy; the upper joints invested with dilated, hood-like sheaths, from each of which springs a solitary spike, on a long stalk, the latter concealed by the sheath. Spikes thread-shaped. Flowers alternate. Corolla red, with a long awn from its base. Retzius's description of a *bractea*, as well as of the parts of the flower, is not clear to us without a specimen. He says this grass has entirely the aspect of an *Andropogon*.

R. monandra, Cavan. Ic. v. 1. 27. t. 39. f. 1. Lec. cion. 52, seems rather a species of *Nardus*, and is, we believe, the *N. aristata* of Linnæus, under which name it was sent to Mr. Davall, by signor Molineri, from Piedmont. See NARDUS, n. 2, where Cavanilles may safely be cited.

ROTTE, in Geography. See ROTAI.

ROTTELN, a town of the duchy of Baden; five miles N.N.E. of Bale.

ROTTEN STONE, in Mineralogy, a decomposed stone, used for polishing. See TRIPOLI.

ROTTENBACH, in Geography, a town of Bavaria, in the territory of Nuremberg; three miles S.S.W. of Lauf.

ROTTENBERG, a town of Bavaria; 14 miles N.N.W. of Landshut.

ROTTENDEAN, a village of England, in Suffex, very near the sea, and frequented for sea-bathing; four miles S. of Brighthelmstone.

ROTTENEG, a town of Austria; 13 miles S.W. of Freyflatt.

ROTTENMANN, a town of the duchy of Stiria; 20 miles

miles N.W. of Judenburg. N. lat. $47^{\circ} 26'$. E. long. $14^{\circ} 8'$.

ROTTENNESS, PUTREDO. See PUTREFACTION.

ROTTENSTEIN, in *Geography*, a town of Bohemia, in the circle of Konigingratz; eight miles W.N.W. of Geyerberg.

ROTTERDAM. See ANAMOOKA.

ROTTERDAM, a fortress in the island of Celebes, near Macassar, belonging to the Dutch. It lies about 800 feet from the beach, opposite to the road of Macassar, where a pier-head extends, which serves for unloading of the ships, and close to which there are 15 or 16 feet of water. The church is a neat building, and has room for 200 persons. The walls of the fortress are high and strong, and constructed of rock-stone. See VLAARDINGEN.—Also, a small island in the gulf of Manaar, near the W. coast of the island of Ceylon; 10 miles N. of Manaar.—Also, a town of America, in New York, on the N. side of Oneida lake.—Also, a city and sea-port of Holland, situated on a river named "Rotter," where it joins the Meuse. This place had the privileges of a city not long after the year 1270. It has been accustomed to hold the first rank in the assembly of the states among the small cities of Holland; and next to Amsterdam it used to be reckoned the richest and most flourishing city of the whole state, on account of the convenience of its harbour, where depth of water allowed the largest vessels to enter, and canals facilitated their loading and unloading at the warehouses of the merchants. The port of Rotterdam was more frequented by British traders than that of Amsterdam, because when vessels had weighed anchor, one tide brought them out to sea. Among the principal buildings are the town-house, the bank, the East and West India houses, the arsenal, and some of the churches, particularly that dedicated to St. Laurens. On the E. side of the city are a large basin and dock, for the purpose of building and launching vessels in the service of the Admiralty, and the East India Company. The magistracy consists of a council of 24, out of which are elected four burgomasters, a grand bailiff, and seven echevins. Besides the magistracy of the city, here are also three other tribunals, viz. the college of the grand bailiff, or dyckgrave of Schieland, and council, composed partly of nobility and partly of the cities of Rotterdam, Goude, and Schiedam, that hold their assemblies at Rotterdam, in a house called Landhuys, whose business it is to inspect the dykes, superintend the roads and canals, and take care of every thing that pertains to the environs of the city; the second tribunal is that of the judges of Schieland, whose jurisdiction extends over what does not belong particularly to the magistrates of cities; the third is the college of the lords of the admiralty for the Meuse, who have a house appropriated to that business. Rotterdam was the birth-place of Erasmus, and it is said that his statue still remains, and also the house in which he was born. The streets are long and generally narrow, and the foot pavement is only distinguished by a clean line of bricks; the population is estimated at about 48,000 people; 30 miles S.S.W. of Amsterdam. N. lat. $51^{\circ} 55'$. E. long. $4^{\circ} 24'$.

ROTTE, a town of Norway; 50 miles N.E. of Romfald.

ROTTI, an island in the gulf of Venice, near the coast of Friuli. N. lat. $45^{\circ} 45'$. E. long. $12^{\circ} 9'$.

ROTTINGEN, a town of the duchy of Wurzburg, on the Tauber; 13 miles W.N.W. of Rottenburg.

ROTTL, a river of Austria, which runs into the Danube, six miles above Lintz.

ROTTLERA, in *Botany*, is so called in honour of the

Rev. Dr. Rottler, Danish missionary at Tranquebar, who like several of his brethren in that remote situation, has alleviated his more serious occupations with the study of plants; and, besides acquiring himself a considerable knowledge of botany, has been eminently serviceable to the science, by his communications to his European friends. The original *Rottlera* of Willdenow proving the identical *Trewia nudiflora* of Linnæus, the present, chosen by Dr. Roxburgh, has been received subsequently by Willdenow, as well as in Hort. Kew. Thus the *Rottlera* of Vahl, in his *Enumeratio*, v. 1. 87, is superfluous, and if a good genus, must have another name.—Roxb. Coromand. v. 2. 36. Willd. Sp. Pl. v. 4. 832. Ait. Hort. Kew. v. 5. 406.—Class and order, *Dioecia Icosandria*. Nat. Ord. *Tricocca*, Linn. *Euphorbia*, Juss.

Gen. Ch. Male. *Cal.* Perianth of one leaf; tube short; limb in four deep, ovate, reflexed segments; the two opposite ones rather the smallest. *Cor.* none. *Stam.* Filaments between thirty and forty, capillary, erect, inserted into the tube of the calyx, and about the length of its limb; anthers linear, cloven at each end.

Female, on a separate tree, *Cal.* Perianth inferior, bell-shaped, with four erect teeth. *Cor.* none. *Pist.* Germen superior, ovate, powdery; styles three, reflexed; stigmas feathery. *Peric.* Capsule roundish, powdery, three-lobed, three-celled, three-valved, the partitions from the centre of each valve. *Seeds* solitary, globose.

Ess. Ch. Male. Calyx deeply four-cleft, reflexed. Corolla none. Stamens thirty to forty.

Female. Calyx four-toothed, erect. Corolla none. Styles three. Capsule superior, three-lobed, three-celled. Seeds solitary.

1. *R. tinctoria*. Dyer's *Rottlera*. Roxb. Corom. v. 2. 36. t. 168.—Native of the inland mountainous parts of the circars of Hindoostan, flowering in the cold season. Dr. Roxburgh never found it any where else. This is a middle-sized, erect, branching tree. *Leaves* alternate, stalked, elliptic-oblong, acute, entire, from four to eight inches in length, three-ribbed and veiny; nearly smooth above; downy beneath; furnished at their base with two brown glands. *Footstalks* round, downy, from one to three inches long. *Flowers* small, in clusters, about the tops of the branches, axillary and terminal; the latter branched. *Capsules* the size of a small cherry, clothed with abundance of deep red granular powder, easily rubbed off. This powder is a valuable article of commerce, being much esteemed, especially among the Moors, for dyeing silk of a deep, bright, very beautiful and durable, full-orange or flame-colour. When the capsules are ripe, in February or March, they are gathered, and the powder carefully brushed off. It is preserved without any further process, and is sold to the merchants trading to Hydrabad, and other inland parts. This substance is but little acted upon by water, except with the admixture of alkaline salts, when it gives out a very deep blood-red colour. To spirits it communicates a rich, deep, reddish flame-colour; but in neither instance does it dissolve, the grains remaining entire, like sand. The inhabitants know this powder by the name of *Wassunta-gunda*, and use it in the following manner. To four parts of *Wassunta-gunda* are added one of alum, and two of salt of soda, native barilla. These are rubbed well together, with a portion of expressed oil of *Sesamum*, so small as hardly to be perceived. When well mixed, the whole is put into boiling water, in quantity proportioned to the silk which is to be dyed, and kept boiling smartly, more or less time, according to the shade required. The silk is turned frequently, to render the colour uniform.

ROTTO.

ROTTOCOMB, in *Geography*, a town of Africa, in Bornou; 8 miles S. of Bornou.

ROTTOFREDO, a town of the duchy of Piacenza; 5 miles W. of Piacenza.

ROTTOLO, in *Commerce*, a weight used in Italy and the Levant. At Aleppo, and its port Scanderoon, the cantaro contains 100 rottoli, each of which is subdivided into 12 ounces, or 720 drachms; the great cantaro of Tripoli contains 175 rottoli, and the zurlo consists of 27½ rottoli. This rottolo, with which most sorts of goods are weighed, weighs 5 lbs. avoirdupois nearly. The rottolo with which the silks from Tripoli, and other parts of Syria, are weighed, consists of 700 drachms, answering to 4½ avoirdupois. The rottolo used in weighing the Persian silks contains 680 drachms, or nearly 4¾ lbs. avoirdupois. The rottolo of Damascus, with which brags, camphor, benzoin, spikenard, balsam of Mecca, and other drugs are weighed, contains 600 drachms, or 4½ lbs. avoirdupois. Five rottoli, or 3600 drachms, make what is called a *vestro*; which see. At Saide, in Syria, (the ancient Sidon,) silk and fatten yarn are weighed with the rottolo of Damascus, of 600 drachms; 100 such rottoli answering to about 410 lbs. avoirdupois. Heavy goods are weighed with the rottolo of Acre, 100 of which are = 482 lbs. avoirdupois. At Constantinople, the cantaro, or quintal, contains 44 okes, or 100 rottoli; and the cantaro weighs about 123¾ lbs. avoirdupois, the oke 2 lbs. 13 oz., and the rottolo 19½ oz., and the chequee 11¼ oz. avoirdupois. At Leghorn, the rottolo is 3 lbs. At Naples, the cantaro grosso contains 100 rottoli, each weighing 33½ ounces of the gold and silver weight, or 31¾ ounces avoirdupois. Hence 28 rottoli = 55 lbs. avoirdupois, and the cantaro grosso = 196½ lbs. avoirdupois. The cantaro piccolo is = 106 lbs. avoirdupois nearly.

In Sicily these different weights are used, *viz.* the rottolo grosso of 33 ounces, the rottolo sottile of 30 ounces, and the libra, or pound of 12 ounces. 10 lbs. of Sicily = 7 lbs. avoirdupois nearly; and, therefore, 40 rottoli grossi, or 44 rottoli sottili = 77 lbs. avoirdupois. A cantaro grosso contains 100 rottoli grossi, or 192¾ lbs. avoirdupois; a cantaro sottile is 100 rottoli sottili, and is = 175 lbs. avoirdupois. At Smyrna, the cantaro, or kintal, contains 45 okes, or 100 rottoli. The batman is 6 okes, or 2400 drachms; and the oke is 400 drachms, and the rottolo = 180 drachms. The cantaro of 45 okes weighs 123 lbs. 4 oz. avoirdupois; and, therefore, the oke is = 2 lbs. 11 oz. 13 drs. avoirdupois. At Tripoli, the cantaro weight contains 100 rottoli, each of 6 ounces, or 128 termini; this cantaro answers to 168 lbs. peso sottile of Venice, or about 12 lbs. avoirdupois. At Tunis, the cantaro contains 100 rottoli, each of 16 Tunis ounces, and weighs about 111 lbs. avoirdupois. Kelly's Cambist. See **WEIGHT**.

ROTULA, in *Anatomy*, the patella or knee-pan. See **EXTREMITIES**.

ROTULA, *Dislocations and Fractures of*, in *Surgery*. See **FRACTURE**, and **LUXATION**.

ROTULA, in *Natural History*, the name of a genus of the echini marini, of the general class of the placentæ. The characters of the rotulæ are, that they are flat shells in form of a cake, composed of various flat pieces, and formed into a round, something like that of a wheel, but wanting one or more parts of its outer ring, and radiated or dentated; their mouth is situated in the middle of the base, and the aperture of the anus in the third region of the axis, and marked with a cinquefoil flower at the summit. The great obvious character is, however, the dentated edge. Of this genus there are two known species.

ROTULA, in *Ichthyology*, is also a name given by some to the faber, or dorec.

ROTULI Magni Ingrossator. See **INGROSSATOR**.

ROTULORUM CUSTOS. See **CUSTOS**.

ROTULUS, a roll. See **ROLL**.

ROTULUS Contrarientium. The earl of Lancaster taking part with the barons against king Edward II., it was not thought fit, in respect of their power, to call them rebels or traitors, but only *contrarientis*; accordingly, we have a record of those times called *rotulus contrarientium*.

ROTULUS Wintonia, an exact survey of all England, by counties, hundreds, and tithings, made under king Alfred, not unlike that of Domesday.

It was thus called, because anciently kept at Winchester among other records of the kingdom.

ROTUNDA FENESTRA, in *Anatomy*, an opening of the cochlea into the tympanum. See **EAR**.

ROTUNDA Ligamenta Uteri, two fibrous cords ascending from the uterus, and passing through the abdominal rings. See **GENERATION**.

ROTUNDO. See **ROTONDO**.

ROTUNDUM FORAMEN, in *Anatomy*, an opening of the sphenoid bone. See **CRANIUM**.

ROTUNDUS, a name given to several muscles from the roundness of their body.

Such are the *rotundus major*, called also *teres major*, and the *rotundus minor*, called also *teres minor*, and *transversalis*.

ROTUNDUS, Pronator Radii. See **PRONATOR**.

ROTZ, in *Geography*, a town of Austria; 24 miles N. of Tulln.

ROTZHOF, a town of the duchy of Stiria, on the river Muehr; 16 miles S. of Gratz.

ROU, or **PULO ROU**, a small island in the Chinese sea, near the coast of Malacca. N. lat. 6° 43'. E. long. 102° 10'.

ROUAD. See **RUAD**.

ROUAGE, Battery en. See **BATTERY**.

ROUAITHA, in *Geography*. See **ROAITHA**.

ROUALTHA, a town of Arabia, in the province of Hedsjas; 108 miles S.S.E. of Mecca.

ROVANIEMI, a town of Sweden, in the government of Ulea, on the Kemi; 55 miles N.N.E. of Tornea.

ROUARA, a town of South America, in Guiana.

ROVASIO, a town of France, in the department of the Sesia; 15 miles N. of Vercelli.

ROVATO, a town of Italy, in the department of the Mela; 10 miles W.N.W. of Brescia.

ROUBAIX, a town of France, in the department of the North, and chief place of a canton, in the district of Lille; 6 miles N.E. of Lille. The place contains 8091, and the canton 13,761 inhabitants, on a territory of 40 kilometres, in four communes.

ROUBAN, a town of Arabia, in the province of Hedsjas; 40 miles S. of Calaat el Moilah.

ROUBBIE', in *Commerce*, a gold coin of Turkey, which is one-third of the sequin, called Mahbub. See **SEQUIN**.

ROUCOU, or **Rocou**, otherwise called *Annotto* and *Orlean*, is a red dye, formed in masses, from the pellicles of the seeds of an American tree. That which is commonly met with among us is moderately hard and dry, of a brown colour on the outside, and a dull red within. Labat informs us, that the Indians prepare a dye of this sort much superior to that which is brought to us; of a bright shining red colour, almost equal to carmine. For this purpose, instead of steeping and fermenting the seeds in water, they rub them with the hands, previously dipt in oil, till the pellicles come

off and are reduced into a clear paste, which is scraped off from the hands with a knife, and laid on a clean leaf, in the shade, to dry. De Laet, in his notes on Marcgrave's Natural History of Brasil, mentions two kinds of roucou, or annotto; one of a permanent crimson colour, used as a *fucus*, and another which gives a colour inclining more to that of saffron. This last, which is our annotto, he supposes to be a mixture of the first sort with certain resinous matters, and with the juice of the root of the tree. See ANNOTTO.

ROUELLE, in *Geography*, a river of France, which rises near Le Quefnoy, and runs into the Scheldt, at Valenciennes.

ROUEN, a city of France, and capital of the department of the Lower Seine, situated on the Seine; before the revolution the capital of Normandy, and the see of an archbishop; 13 posts S.W. of Amiens. The place contains 87,000, and its six cantons 87,000 inhabitants, on a territory of 15 kilometres, in one commune. Rouen is large and commercial, has several manufactures, particularly of cotton, and contains 36 parish churches. In the market-place is a statue of the celebrated maid of Orleans, who was burnt here by the English for a witch. In 1117, when the French were defeated by the English in a battle fought here, the city belonged to the king of England, as a part of Normandy; but in the year 1204, it was surrendered to the king of France. In 1418, Henry V. of England commenced a siege which lasted five months; the inhabitants defending the city with persevering firmness and ardour, and enduring the most severe hardships; but they were at last obliged to surrender, on condition of paying 345,000 crowns of gold, and taking an oath of allegiance to the conqueror, who entered on the 19th of January 1419. N. lat. 49° 26'. E. long. 1° 10'.

ROUEN, in *Agriculture*, a term made use of to signify after-grass, or the hay made from this sort of grass. It is sometimes written *Rouet*. See AFTER-Grass.

This sort of preserved grass is now found by many farmers, in different districts, to be of vast utility and advantage in the spring season for the support of some part of their store-sheep flock, as that of the ewes during the lambing-time, and those other sheep which are to be kept in good condition. In the county of Norfolk, Mr. Bevan has a high opinion of the great value and use of this kind of grass, sometimes preserving the quantity of twenty-eight or thirty acres of it in an excellent state for the ewes and lambs in the early spring. And near Swaffham, in the same county, Mr. Mason is in the practice of keeping grass of this nature from the end of July, and not turning at all into it until early in the spring of the following year, when the fattening bullocks and sheep, which have had hay during the winter, are put into it. The old grass is found to nurse up a great bite of young growth, and both together carry on the bullocks in a very favourable manner; it is also excellent for sheep; nothing at such a season is supposed to equal it. At Burnham, on an exposed piece of thirteen acres of this sort of grass, open to the sea, and the north-east wind, which Mr. Overman kept from Midsummer, ten score and sixteen ewes and their lambs were turned in on the 27th of March, and it kept them well a whole month. It is asserted, that they would have been half starved without it; but that by means of it they were fully supported, to the surprise of many who saw them feeding. This piece was fully *tubed* in every part.

The same system of practice is also found equally useful and important in the county of Essex. Mr. Kitcher, of this district, is in the habit of laying up a pasture of this sort of spring food for his sheep, finding it of such astonishing use, that he is determined not to be without it to great a resource.

And at Ongar, Mr. Dyer shuts up grass for the use of his sheep, both ewes and lambs, in March and the following month: it is found that the young grass shoots up with it in an extraordinary manner, and that his flock does better on it than on turnips. Also at Gosfield, Mr. Thurlow shuts up a space of grass from the beginning of September to the lambing-time, and finds it of very considerable advantage to his flock.

ROVER. See PIRATE.

ROVERBELLA, in *Geography*, a town of Italy; 12 miles N.N.W. of Mantua.

ROVEREDO, or ROVERETH, a town of the county of Tyrol, with a strong citadel, built by the lords of Castelbarco; but in the year 1414, it was taken from them by the Venetians, from whom Maximilian I. wrested it again by the sword, and incorporated it with the county of Tyrol. This town has a manufacture of fine silk, and carries on a great trade. The wine produced in this tract is called "Goccia d'oro," or golden drops. On Sept. 4th, 1796, Roveredo was taken by the French, after a battle in which the Austrians lost 7000 prisoners, 25 pieces of cannon, 50 waggons, and 7 standards; 8 miles S.E. of Trent. N. lat. 45° 53'. E. long. 11° 3'.

ROERGUE, a province of France before the revolution, about 25 leagues in length, and 18 in breadth, bounded on the E. and S. by Languedoc, on the W. by Quercy, and on the N. by Auvergne. The land, though not very fertile, produces much wood, and here are mines of copper, iron, sulphur, vitriol, &c. The principal rivers are the Tarn and the Lot. The capital city was Rhodéz. It now forms the department of the Aveyron.

ROVERO, a town of Italy, in the Trevisan; 9 miles E. of Cismone.

ROVERSANO, a town of Italy, in the department of the Rubicon; 20 miles W. of Rimini.

ROVERSCIO, AL, or *Per Roverscio*, Ital. in *Music*, reversed, inverted. See RIVOLGIMENTO, and RIVOLTARE.

ROVES, in *Ship-Building*, small square pieces of iron with a hole punched in the middle, through which the nail goes, where it is clenched, and binds together the boards of pinaces, yawls, &c.

ROVETTA, DON GIOVANNI BATISTA, in *Biography*, a Venetian composer, in great favour in the middle of the 17th century, vice maestro di cappello of St. Mark's cathedral, and composer of five or six operas. He likewise was author of Masses and *Madrigali a sei voci concertati*: in scoring one of them, we found the instrumental parts consisted only of two violins, and a base, wholly different from the voice-parts; but, except an introduction or symphony to each movement, and short ritornels, they had little to do. These madrigals were first published in 1625.

ROUEZ *le Guillaume*, in *Geography*, a town of France, in the department of the Sarthe; 3 miles S. of Sillé.

ROUFFACH, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the district of Colmar. The place contains 3292, and the canton 11,882 inhabitants, on a territory of 112½ kilometres, in eight communes.

ROUFFIGNAC, a town of France, in the department of the Dordogne; 9 miles S.W. of Montignac.

ROUGE, a town of France, in the department of the Lower Loire, and chief place of a canton, in the district of Chateaubriant. The place contains 2134, and the canton 7349 inhabitants, on a territory of 160 kilometres, in five communes.

ROUGE, *Cape*, or *Red Cape*, a cape on the N. side of the island of St. Domingo; four leagues W. of Point Isabellica.

Ifabellica.—Also, a cape called “Ras el Hamrah,” on the coast of Algiers. N. lat. $37^{\circ} 5'$. E. long. $7^{\circ} 42'$.

ROUGE River, a river of America, in Louisiana, so called from the colour of its waters, which are said to tinge those of the Mississippi in the time of the floods, rises in New Mexico, and after running about 600 miles, joins the Mississippi 187 miles above New Orleans, $56\frac{1}{2}$ miles below Fort Rosalie, receiving 30 miles from its mouth the Noir, or black river. About 70 leagues up Rouge river the French had a considerable post, called Natchitoches, being a frontier to the Spanish settlements. Tobacco of a superior quality is cultivated at this post in considerable quantities, and sold at New Orleans.

ROUGE Chapeau, or Red Hat, a cape on the coast of North America. N. lat. $46^{\circ} 31'$. W. long. $55^{\circ} 26'$.

ROUGE-Croix, q. d. Red Cross. See POURSUIVANTS.

ROUGE-Dragon, q. d. Red Dragon. See POURSUIVANTS.

ROUGEMONT, in *Geography*, a town of France, in the department of the Doubs, and chief place of a canton, in the district of Baume; seven miles N. of Baume. The place contains 1260, and the canton 8290 inhabitants, on a territory of 170 kilometres, in 26 communes.

ROUGET, in *Ichthyology*, a name given by the French to the fish called the *lyra* and *capo* by authors. It is a species of the trigla, and is distinguished by Artedi by the name of the trigla with a long bifid snout and tubulous nostrils. See TRIGLA.

ROUGH, ROUGHNESS, in *Mechanics*. See FRICTION, and RESISTANCE.

ROUGH Casting. See PLASTERING.

ROUGH Diamond. See DIAMOND.

ROUGH Emerald. See EMERALD.

ROUGH-leaved Plants. See PLANT.

ROUGH Taste. See TASTE.

ROUGH-Tree Rails, in *Ship-Building*, are rails along the waist and quarters of ships, nearly breast high, to prevent persons from falling overboard. This term originated from the practice in merchant vessels of carrying their rough or spare gear in crutch irons along their waist.

ROUGH Rider, a person who is indispensably necessary in every cavalry regiment. He is a sort of non-commissioned officer, and should always associate with the sergeants in preference to the private men.

Rough riders are the assistants of the riding-master, and one should always be appointed to each troop. The necessary qualifications for every rough rider (independently of a thorough knowledge of horsemanship) are activity, zeal, and good conduct.

No rough rider ought to be an officer's servant, as his situation places him above the level of common men.

Rough riders are generally paid five guineas a-year as a compensation for their trouble; they likewise receive 10s. 6d. from every officer who learns to ride, and from every officer who has a horse broke at the riding school. This money is divided equally amongst them.

Every rough rider must provide himself with a proper jacket for the riding school business, according to the pattern fixed upon in the regiment.

When it is found absolutely necessary to employ non-commissioned officers as rough riders, they must do as much troop duty as they can.

ROUGH Horses, *To*, a word in familiar use among the dragoons to signify the act of breaking in horses, so as to adapt them to military purposes.

ROUGH it, *To*, a cant word used among military men, signifying to face every sort of hardship.

ROUGH Creek, in *Geography*, a river of Kentucky, which runs into Green river, N. lat. $37^{\circ} 12'$. E. long. $87^{\circ} 35'$.

ROUGH Skelly, a cape on the E. coast of Scotland. N. lat. $56^{\circ} 36'$. W. long. $2^{\circ} 28'$.

ROUGHCAST WASH, in *Rural Economy*, a sort of liquid wash, or application, employed for the purpose of being laid over the surfaces of outside walls, or buildings, of this nature, in order to preserve and ornament them. It is noticed by Mr. Vancouver, in his report of the state of the agriculture of the county of Devon, that a wash of this kind is getting greatly into use in that district. It consists, in this case, of four parts of pounded lime, three of sand, two of pounded wood-ashes, and one of the scoria of iron, intermixed very intimately together, and made sufficiently thin or fluid as to be applied by means of a brush. It is remarked, that when dry, it gives to the work the appearance of new Portland stone, and affords an excellent protection against the penetrating force of the south-westerly storms in that exposed county. It is also found useful for applying over the outsides of stone buildings or walls.

ROUGHING CLOTH. See CLOTH.

ROUGHINGS, in *Agriculture*, a term sometimes applied to latter-grass, or aftermath, and sometimes to coarse pastures. They are always of the coarse rough tufty kinds, when this epithet is applied to them.

ROUGHY, in *Geography*, a river of Ireland, which falls with an impetuous current into the Kenmare river, about two miles E. of Kenmare town.

ROUGIES, a small island on the W. coast of France, being one of the group called the “Seven Islands.” N. lat. $48^{\circ} 54'$. W. long. $3^{\circ} 21'$.

ROUGNAT, a town of France, in the department of the Creuse; nine miles S. of Evaux.

ROUHA. See OURFA.

ROUHAMON, in *Botany*, a Caribbean name, retained by Aublet for one of his genera. See LASIOSTOMA.

ROULA, in *Geography*, a town of Syria, containing seven fine palaces, some of which are entire, and several churches built in a fine style; 36 miles S.S.W. of Aleppo.

ROUJAN, a town of France, in the department of the Herault, and chief place of a canton, in the district of Beziers; six miles N.W. of Pezenas. The place contains 1129, and the canton 5720 inhabitants, on a territory of 135 kilometres, in 11 communes.

ROVIGNO, or TREVIGNO, a sea-port town of Istria, seated on a rock which projects into the sea, with two harbours capable of containing the largest vessels. It contains about 17,000 inhabitants, chiefly fishermen and boat-builders. In its vicinity are quarries of beautiful marble; 68 miles E. of Venice. N. lat. $45^{\circ} 10'$. E. long. $13^{\circ} 45'$.

ROVIGO, a town of Italy, and capital of the Polefine di Rovigo, on the river Adige, the see of the bishop of Adria, to the decline of which town it owes its increase. It was anciently called Buonvico; it is surrounded with walls, turrets, and battlements. The river divides it into the upper and lower towns, and to the E. is a fortified castle. Exclusive of its suburbs, it is about a mile and a half in circumference, and contains six gates, a collegiate and nine other churches, together with several religious houses and hospitals; 37 miles S.S.W. of Venice. N. lat. $45^{\circ} 4'$. E. long. $11^{\circ} 48'$.—Also, a town of Italy, in the Vicentin, on the Adige; 14 miles S.S.W. of Vicenza.

ROUILLAC, a town of France, in the department of the Charente, and chief place of a canton, in the district of Angouleme; 12 miles N.W. of Angouleme. The place

place contains 1168, and the canton 13,531 inhabitants, on a territory of 252½ kilometres, in 19 communes.

ROUILLE, PETER JULIAN, in *Biography*, a learned Jesuit, born at Tours in 1681, was educated in the Jesuits college of that city, and made his profession in the society in 1715. He successively taught the languages, philosophy, and mathematics in its seminaries. In 1724 he was called to Paris to assist father Catrou in the composition of his Roman History. To this work he only contributed the dissertations. He also revised and corrected the work of father d'Orleans, on the revolutions of Spain, and had a considerable share in the "Memoires de Trevoux" from December 1733 to February 1737. He had previously to this, in 1716, delivered "A Discourse on the Excellency and Utility of Mathematics," printed at Caen in 1716. He was author of some other works, and died, highly respected and esteemed, in the year 1740.

ROUILLY, in *Geography*, a town of France, in the department of the Vienne; 15 miles W. of Poitiers.

ROUL, ROLL, or *Rouul*, in the *Military Art*. Officers of the same rank, who mount the same guard, and take their turns in relieving one another, pursuant to some established roster, as captains with captains, subalterns with subalterns, and command according to the seniority of their commissions, are said to *roul* or *roll*.

ROULADE, Fr. in *Music*, a division or passage in a song of many notes to one syllable. (See DIVISION and NEUME.) A roulade is only an imitation of instrumental melody, either to grace a treble part, render an image more obvious, enforce the expression, or, when it is necessary, to suspend the discourse and prolong the melody. But it is likewise necessary that it should be on a long syllable, that the voice should be spirited, active, and capable of allowing the throat full liberty to warble and express with facility and neatness the notes of the division, without fatiguing the organs of the finger, and consequently the ears of the audience. Rousseau.

The vowels most proper for these flights are *a*, *o*, and *e*, open. The *i* and *u* are not sonorous, but distort the mouth: the diphthongs still more. (Rousseau is here considering the vocal properties of the French alphabet.) As to the nasal vowels or syllables, they should never be employed in roulades. The Italian language, in which the *a* and *o* abound, is more fit for inflexions of voice than the French; and these vowels are not spared by Italian composers, but brought into action as frequently as possible. On the contrary, the French, obliged to compose almost all their melodies to syllables instead of vowels, on account of their defects, are constrained to give the notes a slow and heavy motion, or to admit a clash of consonants in accelerating syllables; which necessarily renders the melody languid or harsh. And we join with the citizen of Geneva in confessing, that we throw French vocal music can never surmount these inconveniencies.

"It is a vulgar prejudice to imagine, that divisions are improper in plaintive and pathetic airs; on the contrary, when the heart is moved and affected to an uncommon degree, the voice more easily finds accents of passion, than the mind can furnish words, and thence arise interjections in all languages. (See NEUME.) It is equally erroneous to imagine that a division is always proper, whenever a favourable vowel or syllable occurs, without considering the situation of the finger, and whether the sentiment, which he ought to express, authorizes it.

"Roulades are of modern invention. It does not appear that the ancients ever admitted them in their music, or ever gave them more than two notes to a syllable. And this

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constitutes the difference between the two musics; one of which was subservient to the language, to which the other gives the law."

These reflections are admirable, deep, comprehensive, and convincing; yet, since they occurred to the penetrating author, more changes and refinements have happened in lyric poetry and singing, which make it necessary to extend this article, in order to keep pace with the times.

Till about the middle of the last century, many Italian composers gave divisions to *a*, *e*, and *o*, indiscriminately; all Farinelli's divisions are confined to the vowel *a*. (See a collection of them in Burney's Hist. Mus. vol. iv.) Even the vowel *o* closes the lips and teeth more than the Italian *a*, on which account, we suppose, it has been wholly refused divisions or roulades in its vocal music. See LANGUAGE, *Euphony of*, where this subject has been fully discussed.

ROULAND L'EGLISE, in *Geography*, a town of France, in the department of the Doubs; and chief place of a canton, in the district of Baume; nine miles N.E. of Besançon. The place contains 423, and the canton 9066 inhabitants, on a territory of 250 kilometres, in 33 communes.

ROULERS, a town of France, in the department of the Lys, and chief place of a canton, in the district of Courtnay. The place contains 8063, and the canton 13,587 inhabitants, on a territory of 37½ kilometres, in two communes.

ROULET, a town of France, in the department of the Charente; eight miles S.W. of Angouleme.

ROOM, *i. e.* the kingdom of the Romans, a name given to Natolia, by Solyman, sultan of the Turks, when he invaded and became master of it, in the 11th century. It is now chiefly applied to a part of Asiatic Turkey, extending from the Mediterranean to the Black sea, eastward of Caramania and Natolia, and westward of Armenia and the government of Diarbekir, including the governments of Sivas, Adana, and Marasch.

ROOM *Kala*, a small town and fort of Persia, in the pachalic of Orfa, situated on the western bank of the Euphrates, and inhabited by Turks and Arabs. It was formerly called Zeugma, from a Grecian term signifying a bride, and was the great passage for the Roman armies into Macedonia. There were two small towns, one on each side of the river; the former was called Zeugma, and the latter Apamea. A few miles farther down the river, the caravans travelling from Aleppo to Orfa, pass the Euphrates on a bridge of boats, at a place called "Bir," which, according to M. D'Anville, represents the ancient Bértha, 144 miles from Aleppo and 67 from Orfa, in N. lat. 36° 58'. (See BIR.) It is situated on an eminence on the bank of the Euphrates, protected by a citadel and a wall in a dilapidated condition. At this town, the houses of which are in a ruinous state, a tax is levied on all travellers and merchants who cross the Euphrates, which is here deep, rapid, and about 130 yards broad.

ROOMIEU, a town of France, in the department of the Gers; six miles E. of Condom.

ROUND, ROTUNDUS, in *Geometry*. See CIRCLE, GLOBE, and SPHERE.

ROUND, in *Anatomy*. See ROTUNDUS.

ROUND, in *Music*. A round in catch-books is sometimes called a *canon in the unison*, and sometimes, but erroneously, a *catch*: but it is distinct from both, being no more than a song of as many strains or sections, as parts; which, instead of being begun together, are performed after each

other, always finging different words and different notes in harmony with the rest; till a signal is given, by holding up the hand, for finishing upon the perfect chord of the key note, where the author has placed this final mark, ♮.

ROUND is also used in music to denote a species of fugue. See *ROUNDELAY*.

ROUND, in *Military Language*, signifies a walk or turn, which an officer, commissioned or non-commissioned, attended with some soldiers, commonly six, takes in a garrison, or fortified place, *around* the ramparts in the night-time, to listen if any thing be stirring without the works, and to see that the sentinels are watchful, and do their duty, and all things are in good order.

In strict garrison the rounds go every half hour, that the rampart may be always furnished. The sentinels are to challenge at a distance, and to port their arms as the rounds pass, and let no one come near them. All guards turn out, challenge, exchange the parole, and present their arms, &c.

Rounds are ordinary and extraordinary. The ordinary rounds are three; the *town-major's round*, the *grand round*, and the *visiting round*.

ROUNDS, *Manner of going the*. When the town-major goes his round, he comes to the main guard, and demands a serjeant and four or six men to escort him to the next guard; and when it is dark one of the men is to carry a light.

As soon as the sentry at the guard perceives the round coming, he shall give notice to the guard, that they may be ready to turn out when ordered; and when the round is advanced within about twenty or thirty paces of the guard, he is to challenge briskly; and when he is answered by the serjeant who attends the round, *town-major's round*, he is to say, *stand, round!* and port his arms; after which he is to call out immediately, *serjeant, turn out the guard! town-major's round*. Upon the sentry calling the serjeant to turn out the guard, he immediately draws up the men in good order with shouldered arms, and the officer places himself at the head of it, with his sword drawn. He then orders the serjeant and four or six men to advance towards the round, and challenge; the serjeant of the round is to answer, *town-major's round*; upon which the serjeant of the guard replies, *advance, serjeant, with the parole!* at the same time ordering his men to rest their arms. The serjeant of the round advances alone, and gives the serjeant of the guard the parole in his ear, that none else may hear it; during which period, the serjeant of the guard holds the spear of his halbert or pike at the other's breast. The serjeant of the round then returns to his post, whilst the serjeant of the guard, leaving his men to keep the round from advancing, gives the parole to his officer. This being found right, the officer orders his serjeant to return to his men; says, *advance town-major's round!* and orders the guard to port their arms; upon which the serjeant of the guard orders his men to wheel back from the centre, and form a lane through which the town-major is to pass (the escort remaining where it was) and go up to the officer and give him the parole, laying his mouth to his ear. The officer holds the point of his sword at the town-major's breast while he gives the parole.

ROUNDS, *Grand*, the rounds which are gone by general officers, governors, commandants, or field-officers. When there are no officers of the day on picquet, the officer of the main guard in garrison may go the grand rounds.

ROUNDS, *Visiting*, rounds gone by captains, subalterns, and the town-majors of garrisons.

The grand rounds generally go at midnight; the visiting

rounds at intermediate periods, between sun-set and the reveillé. The grand rounds receive the parole, and all other rounds give it to the guards.

There is also a species of bastard rounds, if we may be permitted the expression, which are gone by a corporal and a file of men; and which are in reality nothing more than a patrol. When challenged, they answer *pat. rounds*.

N. B. The governor of a garrison can order the rounds to go as often as he may judge expedient. Extraordinary rounds are resorted to when any particular event or occurrence is expected, and in cases of tumult, &c.

ROUND *Robbin*, a compact of honour which officers enter into, (when they have cause of complaint against their superior officer) to state their grievances, and to endeavour to obtain redress, without subjecting one more than another to the odium of being a leader or chief mover. The term is a corruption of *ruban rond*, which signifies a round ribbon. It was usual among French officers when they signed a remonstrance, to write their names in a circular form, so that it was impossible to ascertain who signed first. Hence to sign a *round robbin* against any person, is for any specific number of men to sign, one and all, a remonstrance against him. Colonels of regiments have been sometimes treated in this manner. Great judgment, directing motives grounded upon strong facts, should always influence on these nice occasions.

ROUNDS, *Way of the*. See *WAY*.

ROUNDS, *Counter*. See *COUNTER-Round*.

ROUND, *Quarter*. See *QUARTER-Round*.

ROUNDS, among *Masons*, denote the broken pieces of statues.

ROUND-Heads. See *WHIG* and *TORY*.

ROUND-Head Nails. See *NAIL*.

ROUND-House, in *Ship-Building*, that part of the ship abaft, next above the quarter-deck, fitted up with cabins, &c. for the accommodation of the captain.

ROUND-Houses at the head, conveniencies, or seats of ease, for the officers.

ROUND-House also denotes a kind of prison, for the nightly watch to secure persons in, till they can be carried before a magistrate. See *WATCH*.

ROUND-In, or *Round-Aft*, at *Sea*, a term belonging to the main and fore-sail. When the wind largeth, they say, *Let rise the main-tacks, or the fore-tacks! Haul aft the fore-sheet to the cat-head; and the main-sheet to the cub-bridge-head!* And when these sheets are thus haled down, they keep them from flying up with the passarado rope. This work is called *rounding-in*, or *rounding-aft the sail*.

ROUND *Aft*, in *Ship-Building*, the segment of a circle which the stern partakes of from the wing-transom upward.

ROUND *Stern*, the stern of a vessel whose bottom, wales, &c. are wrought quite aft, and unite in the stern-post. Few English vessels are built on this construction, excepting small vessels, as hoys, &c.

ROUND-up of the *Transoms*, the segment of a circle to which they are sided, also of the beams and rails of the stern, to which they are moulded.

ROUND *Niche, Roof, Seam, Sbot, Splice, Table, Top*. See the substantives.

ROUND, in the *Academies*, denotes a circular piste or tread.

ROUND a *Horse, To*, is a general term for all sorts of maneges, upon a volt, or circular tread.

Hence, to round a horse upon a trot, gallop, &c. is to make him carry his shoulders and haunches roundly or compactly, upon a larger or smaller circle, without traversing or bearing to a side.

ROUND Table, the circular table at which the knights of old, who assembled together from different countries to perform the martial exercises of the tournament, were accustomed to eat, on such occasions, to prevent disputes about precedency. Such a table is seen fixed to the eastern wall of the county-hall at Winchester, being vulgarly called "Arthur's Round Table," though it does not appear to be more ancient than the reign of king Stephen. From the use to which these tables were appropriated, the diversion itself of the tournament, or tilting, was called the round table. "Illustris miles, Rogerus de Mortuo-mari apud Kenilworth ludum militare quem vocant rotundam tabulam centum militum ac tot dominarum constituit." Th. Walsingham, Hist. p. 49.

ROUND Towers, those tall slender towers which are almost peculiar to Ireland (some few being found in Scotland), rising to the height of from 50 to 100 feet, or more, and containing not more than five or six feet in diameter in their upper chamber. They have a single entrance-door, of from five to fifteen feet from the ground, and a loop-hole, to give light to each story, of which there are generally six or seven in each round tower. The uppermost story, however, which was the usual dwelling-place of the solitary inhabitant, was furnished with four loop-holes or windows, corresponding with the four cardinal points of the compass. From the nature and situation of these singular structures, they being always very near to the site of an ancient church, it appears that each of them was built for the habitation of a single *Inclusus*, or hermit, who, living in the highest chamber of it, enjoyed his beloved solitude as much as if he had dwelt in a desert. It appears from Giraldus Cambrensis, that Ireland was full of these towers in the 12th century, and there is reason to ascribe the erection of them to the sixth, seventh, and eighth centuries, namely, before the Danish invasions, and during the period of the Irish transmigration into various countries in quest of solitudes. The idea of them and their use were evidently borrowed from the columns and styliques of the East. See **STYLITES**.

ROUND Bay, in *Geography*, a bay with good anchorage, on the W. coast of St. Lucia.

ROUND Cape, a cape on the coast of Patagonia, in the straits of Magellan. S. lat. $53^{\circ} 47'$. W. long. $71^{\circ} 32'$.

ROUND Hill, an island in the North Pacific ocean, near the E. coast of Labrador. N. lat. $53^{\circ} 25'$. W. long. $55^{\circ} 16'$.

ROUND Hill Bluff, a cape on the N. coast of Jamaica, W. of Montego bay. N. lat. $18^{\circ} 29'$. W. long. $77^{\circ} 58'$.

ROUND Heads, Indians of North America, inhabiting the territory on Round river. The number of warriors is about 2000.

ROUND Island, a small island of England, in Pool harbour.—Also, a small island near the E. coast of Borneo, in the bay of Gunong Tellu. S. lat. $0^{\circ} 28'$. E. long. $123^{\circ} 30'$.

ROUND Key, a small island near the coast of West Florida, which is well timbered. N. lat. $30^{\circ} 15'$. W. long. $88^{\circ} 28'$.

ROUND Rock, one of the Virgin islands, in the West Indies. N. lat. $18^{\circ} 10'$. W. long. $62^{\circ} 53'$.

ROUNDELAY, or **ROUND**, a kind of ancient poem, thus called, according to Menage, from its form; and because it still turns back again to the first verse, and thus goes round.

The word is formed from *round* and *lay*. The French call it *rondeau*; the Spaniards *glofas*.

The common roundelay consists of thirteen verses, eight

of which are of one rhyme, and five in another. It is divided into couplets; at the end of the second and third of which, the beginning of the roundelay is repeated; and that, if possible, in an equivocal or punning sense.

The roundelay is a popular poem among the French, but little known among us. Marot and Voiture have succeeded the best in it.

Rapin observes, that if the roundelay be not very exquisite, it is intolerably bad. In all the ancient roundelays, Menage observes, that the verse preceding has a complete sense, and yet joins agreeably with that of the close; without depending necessarily on it. This rule, well observed, makes the roundelay more ingenious, and is one of the finesses of the poem.

Some of the ancient writers speak of the roundelay, or roundel, as a kind of air appropriated to dancing; and in this sense the term seems to indicate little more than dancing in a circle, with the hands joined. See **RONDEAU**.

ROUNDELET. See **RUNDLET**.

ROUNDING, in *Sea Language*, denotes certain old ropes wound firmly and closely about that part of a cable which lies in the hawse, or under the ship's bow, or athwart the stem. It is used to prevent the surface of the cable from being chafed or fretted in those places.

ROUNDING-in generally implies the act of pulling upon any rope which passes through one or more blocks, in a direction merely horizontal; as round-in the weather-braces, &c. It seems to be derived from the circular motion of the rope about the sheave or pulley through which it passes.

ROUNDING-up is expressed of a tackle which hangs in a perpendicular position, without sustaining or hoisting any weighty body; in which case it is the operation of pulling the blocks closer to each other, by means of the rope which passes through them, to compose the tackle; and is opposed to over-hauling, by which the blocks are drawn farther asunder.

ROUNDNESS, **ROTUNDITY**, in *Physics*. See **SPHERICITY**.

ROUND, or **ROUNDELAY**, in *Music*, a kind of burden or ritornello; where the beginning of each couplet is repeated at the end of it.

ROUNDSTONE BAY, in *Geography*, a harbour of the county of Galway, Ireland, in Ballinahinch. It is separated from Birterbui bay by the island of Inishkeele, lying on the west of it.

ROUNREAK, a town of Pegu, on an island formed by the Ava; 42 miles S. of Lundlay.

ROUP, in *Commerce*, a silver coin of Turkey, containing 10 paras, the para being equal to 3 aspers, and 40 paras being equal to the dollar or piastre.

ROUP, in *Poultry*, is a filthy boil or swelling upon their rumps, known by the staring, or turning back of the feathers.

The roup, if not soon remedied, will corrupt the whole body; to prevent which, the feathers are to be pulled away, the swelling laid open, and the matter pressed out; after which the part is to be washed with salt and water, or brine.

ROUPALA, in *Botany*, a name of Aublet. See **RHOPALA**.

ROUPEYROUX, in *Geography*, a town of France, in the department of the Aveyron; 7 miles S.E. of Villafanche.

ROUPIA, or **RUPEE**. See **RUPEE**.

ROUREA, in *Botany*, a name of Aublet's. See **ROBERGIA**.

ROUSAY, in *Geography*, one of the Orkney islands, Scotland, is situated to the north-west of the Mainland of Orkney, from which it is separated by a strait about a mile in breadth. It consists chiefly of a ridge of lofty hills declining on all sides towards the coast. The best cultivated parts of this island are its eastern and south-western sides; but there is a narrow strip of arable land extending round the whole shore. The hills are mostly covered with heath, intermixed with various kinds of grasses, which afford sustenance to a great number of sheep, swine, and black cattle. Opposite to the Mainland, in a romantic situation, stands the house of Westness, which in remote ages was the abode of the celebrated earl Sigard, who fell in the famous battle of Clontarf in Ireland, and is ranked by historians among the greatest heroes of his age. On a flat tract of land, close to the shore, about a quarter of a mile westward from the place, are several "immense piles of stones, evidently the ruins of some ancient structure, around which are to be seen graves formed with stones set on edge, as in some other places; and the name of Swendrow, which it bears, points it out, with great probability, as the scene of the capture of earl Paul, by Swein, the son of Asteif, and the slaughter of his attendants, when he was, with the basest intention, carried a prisoner into Scotland." The ridge known by the whimsical name of the camp of Jupiter Fring, is situated about two miles eastward from Westness. Several standing stones are to be met with in different parts of the island; and there are some tumuli on the south side, near the Freit, also a few Picts-houses.

Contiguous to Rousay, on the north-west, is the small island of Eaglethay, which yields to none of the Orkney isles in beauty of appearance, or conveniency of situation. This island is about two miles long and one broad, and, in conjunction with Rousay, forms one parish; which, according to the population census of 1811, contained 189 houses, and 965 inhabitants. Eaglethay is remarkable in history for having been the scene of the unjust and barbarous murder of St. Magnus, the tutelary saint of the Orkney islands. The church, which is very ancient, is said to occupy the spot on which the assassination was committed. Owing to the natural attractions of this island, several of the counts of Orkney made it their usual place of residence, and their example was followed in later times, when it became the property of the Douglasses and the Monteths. History of the Orkney Islands, by the Rev. Dr. Barry, 2d edit. by the Rev. James Headrick, 4to. London, 1808.

ROUSE *up a Hare*, among *Hunters*. See **HUNTING**.
ROUSE, *To*, among *Falconers*, is when a hawk lifts up and shakes himself.

ROUSHOLM HEAD, in *Geography*, a cape on the S.W. coast of the island of Stronfa. N. lat. 58° 56'. W. long. 2° 34'.

ROUSSE, *Grand* and *Petit*, rocks in the English Channel; 5 miles N.E. from the island of Jersey.

ROUSSEA, in *Botany*, was so called by the writer of the present article, in memory of the celebrated Jean Jacques Rousseau. Botany had spread a charm over the latter years of this distinguished man, and soothed their real or imaginary ills. Whenever he touches on this favourite subject, he communicates the same charm to his readers. Such has been the effect of his example, perhaps above all others, that he would now no longer have to deplore "the gross ignorance and barbarism" of the French, who, about fifty years ago, stared at a botanist with sovereign contempt. His letters on the science have rendered the Linnæan system popular all over Europe. He corresponded with Linnæus, who had dedicated a genus to his name;

which the younger Linnæus, through misapprehension, published as *Ruffelia*, and which is now called *Vahlia*, there being already a *Ruffelia*, named by Jacquin. What we are about to describe was therefore selected as a very fine and singular genus, and it has been generally adopted, both in France and elsewhere.—Smith Plant. Ic. fasc. 1. 6. Schreb. Gen. 792. Willd. Sp. Pl. v. 1. 607. Mart. Mill. Dict. v. 4. Juss. in Sims and Kon. Ann. of Bot. v. 2. 568. Lamarek Illustr. t. 75.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Campanaceæ*, Linn. Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in four deep, equal, widely spreading, tongue-shaped, permanent segments. *Cor.* of one petal, externally rugose; tube nearly globular, almost as long as the calyx; limb in four equal, lanceolate, acute, revolute segments. *Stam.* Filaments four, erect, equal, linear, flattened, somewhat tapering upwards, longer than the corolla; anthers terminal, small, arrow-shaped. *Pist.* Germen superior, pyramidal, quadrangular; style terminal, square, permanent, the length of the filaments; stigma funnel-shaped. *Peric.* Berry? pyramidal, quadrangular, of one cell? with a coriaceous coat. *Seeds* very numerous, lenticular, imbedded in pulp.

Ess. Ch. Calyx in four deep segments. Corolla bell-shaped, four-cleft, inferior. Berry? quadrangular, with many seeds.

1. *R. simplex*. Sm. Ic. t. 6. Willd. n. 1.—Gathered by Commerson in the island of Mauritius, and communicated by Thouin to the younger Linnæus, with about 1500 fine plants besides. This appears to be a *shrub*, of a fleshy habit, climbing over mossy rocks, or stems of trees, in moist situations. The *stem* is thick and knotty. *Leaves* opposite, in pairs crossing each other, stalked, simple, obovate, rather fleshy, distantly toothed, pointed, quite smooth on both sides, with a solitary rib, and many fine transverse veins; their length about three inches; breadth one, or one and a half. *Footstalks* an inch long, even, channelled, smooth. *Stipulas* opposite, between the footstalks, triangular, acute, membranous. *Flowers* solitary, axillary, large, fleshy, on drooping round *stalks*, rather shorter than those of the leaves, accompanied at the base of the stalk by several crowded, membranous, acute *bractææ*, very like the *stipulas*. *Calyx* smooth, an inch long. *Corolla* somewhat downy at the outside; of its colour we have no means of judging. The *fruit* appears to be a coriaceous berry, about an inch in diameter, but we have not seen it fully formed, nor has Commerson left any note respecting the qualities of the plant. In the texture, and external downiness, of the *corolla*, this genus accords not so much with *Campanula* itself, as with others of the same order, *Goodenia*, *Scævola*, &c. To some of these the form of its *signa* approaches, while the *anthers*, so widely differing among themselves in this order, are, in the present instance, very unlike most of the other genera. The opposite *leaves*, and intermediate *stipulas*, evince, as M. de Jussieu observes, an approach in habit to the natural order of **RUBIACEÆ**. See that article.

ROUSSEAU, JOHN BAPTIST, in *Biography*, a French poet of considerable celebrity, was born at Paris in 1671. His father, though only a shoe-maker, contrived to give him a liberal education. By his literary talents he obtained, while very young, admission among persons of rank and taste. In 1688 he attended the French ambassador to the court of Denmark, in quality of page. After this he went with marshal Tallard to England, where he contracted an intimacy with Saint Evremond. In 1703 he was domiciliated with M. Rouille, director of the finances, whom he accompanied to court, and elsewhere, living in tranquillity

in the midst of splendour, and cultivating the Muses, to the neglect of those opportunities which occurred to him of making his fortune. When he was at the height of his reputation, he involved himself in an affair which put an end to his happiness, and rendered him wretched for the remainder of his life. A number of men of letters were accustomed to meet at a coffee-house in Paris, among whom were Rousseau and La Motte, when, in 1708, the opera of *Hesione* made its appearance. Rousseau wrote some verses upon the authors of the words, the music, and the ballet of the piece, which were highly satirical. These were anonymous, and were imputed to Rousseau, who not only denied them, but attempted to fix the blame upon M. Saurin, a man of science and letters, who, from a Calvinist minister, had become a convert to Popery, and resided in Paris. The nature of this discussion it is not necessary to go into, it is sufficient to say, that by an arrêt of parliament, in 1712 Rousseau was condemned to perpetual banishment from the kingdom, not only as a suborner in the accusation of Saurin, but as the author and distributor of the satirical verses. He had already retired to Switzerland, where he was protected by the count de Luc, the French ambassador to the Cantons. He published in Soleure the first edition of his collected works, in the preface to which he ridiculously gives himself the air of one who wrote verses for mere amusement, although it was by his poetry alone he obtained public notice and the favour of the great. When De Luc went to Baden, in 1714, as plenipotentiary for concluding peace with the emperor, Rousseau accompanied him. He there became known to prince Eugene, and by him was taken to Vienna. Here he resided three years, but not being able to restrain himself from exercising his satirical talent, he was obliged to quit that capital for Brussels, in haste. At Brussels he became acquainted with Voltaire, with whom he formed a confidential intimacy, which however did not last very long: jealous of each other's fame, they became bitter enemies, not only endeavouring to blacken each other's moral character, but each, at the expense of his own judgment, depreciating the literary merit of his adversary. Rousseau longed much to revisit Paris, and made intercession with the regent duke of Orleans, who granted him letters of recall, but the poet insisted upon a previous revision of his trial, which he could not obtain. In 1721 he came to England, where he prepared a new edition of his works. This was published in 1723, in two vols. 4to. and produced him 10,000 crowns, which he placed in the fund of the Ostend company. The failure of this company sunk all his fortune, and he was reduced, in the decline of life, to subsist on the benevolence of his friends. Boutet, a notary of Paris, supplied his most urgent wants, but he met with more effectual assistance from the duke d'Arenberg, who, when he quitted Brussels in 1733, settled upon him a handsome pension, besides giving him an apartment and his table in his palace. Rousseau displeased this patron, by calumniating Voltaire, and determined to go to Paris, with the hope of finally obtaining a repeal of his banishment. He had prepared his way by two epistles to persons of weight in that city, and by an ode to the praise of cardinal Fleury on the peace. His efforts were, however, unsuccessful. He could not even obtain a safe-guard for passing a single year in Paris: he accordingly returned to Brussels, where he died in March 1741, at the age of 70. In his last moments he declared he was not the author of the couplets for which he had been banished. The estimate of his moral character depends so much on the belief of his guilt or innocence, in the points respecting which he was accused, that nothing can be more different than its statement by his friends and enemies. There is more agree-

ment in the opinions of his countrymen relative to his poetical character, and it is pretty generally acknowledged that he stands at the head of the ode writers in the French language. "To these compositions," adds his biographer, "he brought great fire and force of expression, copiousness, and grandeur of imagery, and all the harmony of which his language is capable; but the sentiment is generally common, and nothing indicates a soul of the superior order." Of his "Odes" there are four books, of which the first consists of sacred topics, taken from the Psalms. He wrote two books of "Epistles" in verse; "Cantatas;" "Allegories;" "Epigrams;" "Miscellaneous Poems;" "Four Comedies in Verse and three in Prose;" and a "Collection of Letters." These are said to give an unfavourable idea of his temper, but some allowance should be made for a man who was so long an object of the persecution of his enemies, and of whom it was said in his epitaph, that "thirty years he was an object of envy, and thirty of compassion." M. Seguy, in concert with M. the prince of la Tour Tassis, has given a beautiful edition of his works, agreeably to the poet's last corrections. This edition was printed at Paris in 1743, in three vols. 4to. and in four vols. 12mo. containing nothing but what the author acknowledged as his own. Ferron speaks of Rousseau as uniting in himself the excellencies of Pindar, Horace, Anacreon, and Malherbe. He was in habits of correspondence with the abbé d'Olivet, the two Racines, the celebrated Rollin, and other illustrious French characters.

ROUSSEAU, JEAN JACQUES, was born at Geneva in the year 1712. His father was a watch-maker. At his birth, which, he says, was the first of his misfortunes, he endangered the life of his mother, and he himself was for a long time in a very languishing state of health; but as his bodily strength increased, his mental powers gradually opened, and afforded the happiest presages of future greatness. His father, who was a citizen of Geneva, was a well-informed man, and in his shop, he always kept by him some literary works of authority, among which were Plutarch's *Lives*, with which he intermixed such conversations as might be expected from an ardent republican. In his "Confessions," to which all the biographers of Rousseau must go for information, he has recorded several circumstances, which, in his opinion, exerted a lasting influence upon his character; but it is more probable that his ruling propensities were determined by his bodily constitution. This he represents as of the warmest kind, burning with sensuality from his very birth. His school education was very imperfect, and he grew up in habits of idleness, and in the vices of a weak unsteady temper. He was first put apprentice to an attorney, who soon discharged him for his negligence: after this he was put out to an engraver, who disgusted him by his harshness. The fear of chastisement, which he probably well merited, rendered him a fugitive from his master, when he was in his 15th year, at which time he was a restless discontented being, consumed with desires of which he knew not the object, and caressing his fancies for want of realities. He went into Savoy, where he was hospitably entertained by a parish priest, who pleased himself with the idea of making a proselyte from the Genevan reformed church. For this purpose he sent the youth to Ancey, to a Madame de Warrens, an ingenious and very amiable lady, who had, in 1726, left part of her wealth, and the Protestant religion, in order to throw herself into the bosom of the church. This generous lady served in the triple capacity of a mother, a friend, and a lover to the new proselyte, whom she regarded as her son. For farther instruction she sent him to a seminary at Turin, where his conversion was completed,

and

and he got twenty florins in exchange with his new religion. When this money was spent, he found no better resource than to enter into the service of a countess: here he committed a crime, which he acknowledges, in his "Confessions," with the most heartfelt remorse. He stole a ribbon, and when it was found in his possession, he not only denied the theft, but charged an innocent and amiable young woman in the house with it, to whom, in fact, he meant to have presented the ribbon. After the death of the countess, he entered into the family of a nobleman, whose son, a literary man, took pains to instruct him, and treated him rather as a companion or pupil than a servant. But the flattering prospects opened to him by this connection he destroyed by his imprudence and misconduct, and being turned out of doors, after passing some time as a vagabond, he returned to Madame de Warrens. This lady had found means to ally her devotional turn of mind with the indulgence of amorous propensities, of which young Rousseau was an object, though not the only one. Through her interest he obtained a place as secretary to a commission, appointed by the king of Sardinia for surveying lands, and in this employ he continued two years, during which he applied himself to the study of arithmetic and geometry. Music, however, became his passion, and growing disgusted with his other occupation, he renounced it, and took up the profession of music-master at Chamberry. Here he passed eight years, intimately connected with Madame de Warrens, though not without following her example of occasional deviations to other favourites. At length a coldness took place, and Rousseau was recommended by her to the office of tutor to the children of M. Mably, at Lyons. He did not retain this situation very long, but went to Paris, where he lived in obscurity till 1743, when he obtained the appointment of secretary to the French ambassador to the republic of Venice. It was not long before he quarrelled with his superior, and returning to Paris, with an improved knowledge and taste in music, he lived by it, at the same time employing his leisure in the study of natural philosophy and botany. He was for some time clerk to a farmer-general, and with part of the profits which he gained in this situation he repaid some of the pecuniary assistance he had received from Madame de Warrens, who now stood in need of it. In 1748 he began to feel the attacks of a painful disorder, which troubled him during the remainder of his life, and by incapacitating him for active employments, might perhaps be a remote cause of his literary fame. The year 1750 was the commencement of his literary career. The academy of Dijon had proposed the following question, "Whether the revival of the arts and sciences has contributed to the refinement of manners." Rousseau, it is said, at first inclined to the affirmative side of the question; but by the persuasion of Diderot he was induced to support the negative, as most likely to attract notice. His discourse against the advantages of the sciences accordingly having been found to be the best written, and replete with the deepest reasoning, was publicly crowned with the approbation of this learned body, and was generally read with the interest usually inspired by a splendid paradox. Several answers appeared against it, one of which was written by Stanislaus, king of Poland: it was enough for Rousseau to have made his name known with so much distinction in the literary world. The part which he took seems to have made a lasting impression upon him, in preference of the savage to the civilized life, which was so frequent a subject of his declamation. Among other attacks which this discourse drew upon him, was that of being ridiculed on the stage of Nancy, by Palissot, in his "Comédie des Philosophes." The king of Poland, then duke of Lorraine, was

so much displeased with this insult, that he caused a letter of apology to be written to Rousseau, at the same time acquainting him that he had deprived Palissot of his place at the academy of Nancy, and it is highly to the credit of the philosopher, that he immediately interceded for him and obtained his restoration.

In 1752 Rousseau wrote a comedy, entitled "Narcisse, ou l'Amant de lui-même." He also composed a musical entertainment of "Le Devin du Village," which was represented with the greatest success at Paris. His next piece was "Lettre sur la Musique Française," which was to prove that the French had no such thing as vocal music, and that, from the defects in their language, they could not have it. The letter was written with much taste, and shewed a deep knowledge of the subject of which he was treating, but it brought down upon his head a storm of resentment, even to the burning of him in effigy. In 1754 he returned to Geneva, where he abjured the Catholic faith, and was restored to the rights of citizenship. For this favour he made a return by the patriotic, and truly eloquent dedication to the republic, of his "Discours sur les Causes de l'Inégalité parmi les Hommes, et sur l'Origine des Sociétés." No one could give better advice to his fellow-citizens than Rousseau has done in his dedication. The work itself is full of almost unintelligible maxims and wild ideas; and was written with a view to prove that mankind are equal; that they were born to live apart from each other; and that they have perverted the order of nature in forming societies. He bestows the highest praise on the state of nature, and deprecates the idea of every social compact. It is, however, rhetorical rather than argumentative, and is over-run with much idle declamation in praise of a savage, and depreciation of a civilized state, which the author repeated so often till he probably believed the paradox. Our author did not remain long at Geneva, but returned to France, and lived some time at Paris, after which he retired to Montmorency, as a studious solitary, and published, in 1758, his "Lettre" to M. D'Alembert on the design of establishing a theatre at Geneva. This tract is written with great force of reasoning, and shews that the author had made the most profound observations on life and manners; and he seems to have carried his point in proving that a theatre could not be necessary in a place circumstanced as Geneva was. This work is thought to have laid the foundation of that hatred which Voltaire never ceased to entertain for the Genevan philosopher. Replies were written by D'Alembert and Marmontel.

In 1760 Rousseau published his celebrated novel, entitled "Lettres de deux Amans, &c." but generally known by the title of "Julie, ou la Nouvelle Héloïse." This epistolary romance, of which the plot is ill-managed, and the arrangement bad, like all other works of genius, has its beauties as well as its defects. Some of the letters are, indeed, admirable, from the force and the warmth of expression, from an effervescence of sentiments, from the irregularity of ideas which always characterize a passion carried to its height. By one critic it has been assumed that none of the personages of this novel are really interesting. "That of St. Preux is weak, and often forced. Julia is an assemblage of tenderness and pity, of elevation of soul, and of coquetry, of natural parts and pedantry. Wolmar is a violent man, and almost beyond the limits of nature. In fine, when he wishes to change his style, and adopt that of the speaker, he does not long support it, and every attempt embarrasses the author and cools the reader. In the Héloïse, Rousseau's talent of rendering every thing problematical, appears very conspicuous, as, in his arguments in favour of, and against, duelling, which afford an apology for suicide, and a just condemnation

demnation of it; of his facility in palliating the crime of adultery, and his strong reasons to make it abhorred; on the one hand, in declamations against social happiness, on the other in transports in favour of humanity; here in violent rhapsodies against philosophers; there by a rage for adopting their opinions; the existence of God is attacked by sophistry, and Atheists confuted by the most irrefragable arguments; the Christian religion combated by the most specious objections, and celebrated by the most sublime eulogies." In the preface to this work the author attempts to justify his consistency; he says public spectacles are necessary for great cities, and romances for a corrupted people. "I have," he adds, "viewed the manners of my age, and have published these letters. Why did I not live at a time when I ought to have thrown them into the fire." He affects also to say that they were not intended for an extensive circulation, and that they will suit but few readers. With regard to their effects on the female sex, he pretends to satisfy his conscience with saying "No chaste young woman ever reads romances; and I have given this book a decisive title, that on opening it a reader may know what to expect. She who, notwithstanding, shall dare to read a single page is undone; but let her not impute her ruin to me—the mischief was done before." This is mere rant, and the extreme of vanity. Rousseau rendered his work as seductive as possible, and would have been mortified beyond measure could he have believed that it could readily have been laid aside by any one who had opened it. Besides, had he been that moral man which he would affect to be, he ought, knowing its tendency, to have committed it to the flames, instead of sending it to the press. In truth, he assumes in it the tone of a moral teacher of the highest order, nor will it be denied that, amidst much improper matter, it contains many lessons of domestic prudence and exalted virtue. "In warmth of painting, and eloquence of sentiment, it must be allowed to have no superior in its class; in moral inconsistency and improbability, scarcely an equal. With a profound knowledge of the human heart, it joins great ignorance of life and manners; with much sober and useful truth, all the extravagance of exaggerated feeling. It is a dangerous work, but has been the parent of others still more dangerous, because affording easier objects of imitation."

Rousseau's next work was entitled "Du Contrat Social, ou Principes du Droit Politique," which was said to be a mere extract from one on a much larger scale, which he had commenced, but which he had long since abandoned as beyond his powers. In this he is the fearless and intrepid vindicator of republicanism, and is supposed to have done much to excite the late disastrous French revolution. The work was prohibited in France and Switzerland; and from its publication may be dated that warfare between the author, and the supporters of existing establishments, civil and religious, which exposed the remainder of his life to persecution.

In 1762 Rousseau published his "Emilie, ou de l'Education," which may be regarded as his principal work, as it was that in which he most boldly attacked or opposed the commonly received opinions, and, in consequence, excited against himself the greatest mass of hostility. The fundamental idea of Rousseau in education is to suffer the youthful mind to develop by itself, rather preventing it from imbibing any thing mischievous, than hastening to impress it with lessons of preceptive instruction; presenting to it objects of nature rather than of art, and regulating the conduct more by restraints of necessity than of principle, till a foundation is laid for the operation of reason unbiassed by habit and prejudice. Rousseau's pupil is to follow nature in every

thing; the precepts of the philosopher are expressed with the force and dignity of a mind full of the leading truths of morality. If he himself has not always been virtuous, nobody has felt its force more, or made it appear to more advantage; and he merits great applause for the manly and independent spirit, the contempt for luxurious indulgencies and idle parade, which he every where inculcates. The author excited against himself almost all the religious world, by the manner in which he spoke of the attempts to furnish the youthful mind with theological ideas. Yet no one could more eloquently extol the morals of the gospel and the character of its founder than he has done; by this praise, and his sentiments of piety, he displeased the French philosophers, so that there was scarcely any party of men to whom he did not stand in opposition. Of these, however, the most formidable of his antagonists were those possessed of authority. The French parliament condemned this book in 1762, and entered into a criminal prosecution against the author, which forced him to a precipitate retreat. He directed his steps to his native country, but Geneva shut her gates against him. Both at Paris and Geneva, the "Emile" was burnt by the common hangman: ridiculous attempt of ridiculous governments to stop the circulation of opinions! The book still exists, and, notwithstanding the many and serious objections to which it is liable, deserves to exist, while its tyrannical persecutors have long since been forgotten, and their puny efforts laughed at by every man possessed of an understanding superior to that of an idiot. Rousseau was for a time allowed to take shelter in Switzerland, where he was most hospitably treated by marshal Keith. He there published a letter to the archbishop of Paris, in answer to his *Mandement* for the burning of the "Emile:" and also his "Lettres de la Montagne," which contained a severe remonstrance against the proceedings of the republic of Geneva in his condemnation, the citizenship of which state he formally renounced. That he thought very highly of this work is evident from the following passage: "How," says he, "can I enter into a justification of this work? I who think that I have effaced by it the faults of my whole life; I, who place the evils it has drawn upon me as a balance to those which I have committed; I who, filled with confidence, hope one day to say to the supreme Arbiter, 'Deign in thy clemency to judge a weak mortal: I have, it is true, done much ill upon earth, but I have published this writing.'" In these letters he again expressed his sentiments concerning revealed religion, in a manner that excited against him great indignation among the clergy of Neuchâtel. A consistory was assembled to take his opinions into consideration, but government interfered to stop its proceedings. The protection of the government was not, however, sufficient to rescue him from the obloquy which the clergy excited against him. They preached against the philosopher, and their sermons excited an uproar among the people. In September 1765, some misguided zealots attacked his house and his person, and he sought an asylum in Berne, which was denied him. Neither the broken state of his health, nor the approach of winter, could soften the hearts of his enemies: he entreated them to shut him up in their common prison, which favour they even denied, and he was under the necessity of setting out on a long journey, in the beginning of a very inclement season; he contrived, however, to reach Strasburg in a very destitute condition. He received from marshal de Contades, who was then commander of that place, every accommodation that could be expected from humanity, compassion, and generosity. Here he waited till the weather became more auspicious, when he set out for Paris, where he appeared in the habit of an Armenian. The celebrated Hume was at

this time a resident in that capital, as chargé d'affaires from the English court, and having been applied to in favour of Rousseau, who was desirous of making England his asylum, he willingly undertook to conduct him thither in the beginning of the year 1766. "At this period," says one of his biographers, "the persecutions which he had undergone, the hostility which he had experienced, and with which he had been hunted from place to place; the acrimony of his numerous opponents, and the ferment which his presence had excited in the different places of his residence, had so agitated his susceptible mind, and inflamed his vanity, that he imagined himself not only the most important, but almost the only important personage in Europe, and fancied that a general confederacy was formed against him of all sects and parties. This notion filled him with absurd suspicions, and rendered him prone to view every thing in a wrong light, and to magnify trifles into matters of great moment. In short, he was under the influence of a perversion of temper and intellect, nearly amounting to mental derangement: a malady which, indeed, in a certain degree, seems to have attended him through life, and which alone can account for his singularities and inconsistencies." Without this clue, his conduct to Mr. Hume must appear the extreme of baseness and ingratitude. This gentleman, sensibly affected with his various misfortunes, procured for him an agreeable situation in England, but Rousseau was not long satisfied with the new place. He had wished for peace, but peace and quiet he was utterly incapable of enjoying. He did not make such an impression upon the minds of the English as he had done upon the inhabitants of other countries. The freedom of his opinions, and the settled melancholy of his temper, were not deemed very remarkable or singular here. He was regarded only as an ordinary man: in the public prints he was satirized; his principles and conduct were represented as quite adapted to a modern Diogenes. He was rather regarded as an object of ridicule than of terror to any of the prevailing parties in England. Rousseau now imagined there was a plot between Hume and the French philosophers to destroy his glory. He sent a letter to him, filled with the most violent abuse, and at the same time refused to accept a pension from the crown, which had been obtained through the interest of Mr. Hume. He did not remain long in England after this, but went to France in the year 1767, where he met with various protectors, with whom he passed his time in different provinces. At this period he published his "Dictionnaire de Musique," which, though an excellent work, brought upon the author much severity of criticism. In the following year he resumed his botanical pursuits, by collecting and studying the plants which he found on the mountains of Dauphiné. In the year 1769, he married a lady with whom he had lived many years, and by whom he had already had five children, all of whom he had safely sent to the orphan hospital. This has been justly esteemed in this country as one of the greatest stains upon his character, though his foreign biographers take little notice of it, and seem to think he was justified by the indigence in which he lived. But how could a man venture to talk of morality, and write upon education, who had abandoned his own children? Notwithstanding his other merits, he must in this respect be held in abhorrence by every feeling mind. During the year 1770, he appeared at a coffee-house in Paris in his ordinary dress, and took much pleasure in the plaudits of the surrounding crowd. Though he affected the love of solitude, yet he was never easy unless he could in some way or other occupy the public attention. He could neither accommodate himself to the world, nor be content to live out of it. Nevertheless, some of

his latter years he seems to have passed more tranquilly than any former period of his life, having, in a good measure, renounced all farther discussion of those controverted topics which had involved him in so many difficulties, and determined to keep his philosophy for his own use. Still he suspected that a confederacy was making against him, and he gladly accepted, in May 1778, an invitation from the marquis de Girardin, to retire with his wife to a small house near his beautiful seat of Ermenonville, where he died in the month of July in the same year, at the age of 66. His friend and patron, the marquis, erected a monument for him in the Isle of Poplars, in his pleasure grounds, with an inscription, to which Rousseau was by no means entitled: "Ici repose l'Homme de la Nature et de la Verité."

After the death of this philosopher, his "Confessions" were published, which give a minute account of every thing that happened to him till the 30th year. This singular piece of biography is itself a striking exemplification of character, for there is hardly any work in which circumstances so degrading and humiliating are related with so little reserve, while the air of importance given to the most trivial incidents in which he was any way concerned, and the contempt of shame implied by exhibiting himself thus naked to the world, prove it to have been dictated more by vanity and self-importance than by contrition. He would have passed for a better man if this work had not been published, but then he could not have had any pretext for talking so much of himself. "His Confessions," says M. Sennebier, author of the Literary History of Geneva, "appear to me a very dangerous book, and paint Rousseau in such colours as we should never have ventured to apply to him. The excellent analyses which we meet with of some sentiments, and the excellent anatomy which he gives of some actions, are not sufficient to counterbalance the detestable matter which is found in them, and the unceasing obliquities every where to be met with." There is no doubt that he has done much mischief to the interests of morality by these "Confessions," as well by the baseness of the vices which he has disclosed, as by the manner in which he united them with the virtues. Among the other pieces of Rousseau, not already noticed, and which were published after his death in a new edition of his works, are, 1. The Reveries of a solitary Wanderer, being a journal of the latter part of his life. In this he confesses that he preferred sending his children into hospitals destined for orphans, than to take upon himself the charge of their maintenance, and endeavours to palliate this shameful dereliction of duty. 2. Considerations upon the Government of Poland. 3. The Adventures of Lord Edward, a novel, being a sort of supplement to his *Héloïse*. 4. Various memoirs and fugitive pieces, with a great number of letters. 5. *Emilia and Sophia*. 6. An opera and a comedy. 7. Translations of the first book of Tacitus' History, &c. &c. Like all the other writings of Rousseau, there are in these posthumous pieces many admirable and useful things; but at the same time they abound with contradictions, paradoxes, and ideas very unfavourable to religion. In his letters especially, we see a man chagrined with misfortunes, which he never attributes to his own want of conduct: he is suspicious of every body about him, calling and believing himself a lamb amidst wolves. All his works are marked with a peculiar warmth and energy of style, and with great vigour of thinking. He was one of the first writers who exercised the greatest influence upon the opinions of the age, and in the early periods of the French revolution, they were referred to as of the highest authority in political matters, and his memory was almost deified. His reputation has since been much in the wane; but as long as the French language

language remains, he must be regarded as one of its great authors. The best edition of his works collectively is in 27 vols. 4to. The principal authorities for the life of Rousseau, independently of his own Confessions, are Senne- bier Hist. Lit. de Geneve, and Nouv. Dict. Hist.

In 1768, Rousseau's animated and instructive Musical Dictionary was published, collected chiefly from his musical articles in the Encyclopédie; and as he gave no quarter in it to French music, the admirers and defenders of that music have treated his opinions with equal severity. It is, however, the business of true critics not only to point out the errors of a work, but, if it has any, the merit. There may be mistakes in Rousseau's Dictionary, but are there no good articles, no marks of refined taste and nice observation in speaking of dramatic music? No short, clear, and happy definitions of musical technica? And is every thing he has said of French music thought so absurd and paradoxical at present, even in France, as it was thirty years ago? The abbé Roussier, and his disciple M. de la Borde, who treat as *absurd* and stupid whatever seems unfavourable to their doctrines, were awed perhaps by the thunder of Rousseau's eloquence, while alive; but no sooner were they sure that the lion was dead, than they plucked up a courage, and boldly attacked him at all points.

We must add, in justice to Jean Jacques, that more good taste, intelligence, and extensive views are to be found in his original articles, not only than in any former musical dictionary, but in all the books on the subject of music which the literature of France can boast. And his "Lettre sur la Musique François," may be safely pronounced the best piece of musical criticism that has ever been produced in any modern language.

It must, however, be confessed, that his treatment of French music is very sarcastic, not to say contemptuous; but the music, the national character *avantageux*, and exclusive admiration of their own music, required strong language. It had been proved long since, that they were not to be laughed out of their bad taste in any one of the fine arts: the national architecture, painting, and sculpture, were, in general, bad, and not what a traveller returning from Italy could bear to look at: though there have been now and then individual French artists of every kind, who have travelled and studied antiquity as well as the great masters of the Italian school; and it is now said, that at the Institute they are trying seriously to correct their errors, and to establish a classical taste throughout the empire.

Yet, after all our sincere encomiums on Rousseau as a musical critic, particularly in the melodrama, and though we subscribe to most of his musical opinions, and defend them, yet we must leave him in the hands of his enemies with respect to Blainville's *new mode*, in recommending which he is totally indefensible. But in the year 1751 he was young in musical theory, and the laws of composition; he had read little, and not studied much; but in 1768, after working so long for the Encyclopédie, in which labour to teach others he must have educated himself, nothing but the state of war between him and the intolerant adherents to Rameau and the old school, could have blinded him so far as not to see the absurdity of Blainville's pretensions to the merit of having invented a new mode, or third key in music, different from the major and minor modes in common use.

It may perhaps be alleged, even by the friends and admirers of his musical writings, that he was more unwilling, than so acute and perspicacious a logician ought to have been, to relinquish his new system of *musical notation*, which he published under the title of "Dissertation sur la Musique moderne," in 1743, when very young, and his knowledge

of music superficial. Forty years had not weaned him from his partiality for this juvenile production; for he not only republished it in 1768, in his Musical Dictionary, but near the end of his life, in 1778, he still persisted in explaining and recommending its adoption: as Fontenelle, at near 100, wrote and published a tract in favour of the Cartesian, and Troubillous against Newton's system of gravitation.

Lord Stanhope, and Mr. Baldwyu of Cheshire, are now (1804) at work on a new method of notation, expressing by letters of the alphabet what Rousseau did by numerical figures, with great confidence of success. But neither Rousseau, nor subsequent ingenious framers of a new musical notation, could or would see the inconvenience and even mischief it would occasion to the art, if ever it was generally adopted, by rendering all former music unintelligible, unless every musician and musical student were at the pains of learning two gamuts, or systems of musical notation, instead of one.

Music is at present an universal language throughout Europe. All nations use the same characters, and write and read them with equal facility. Suppose a tyrant in any one kingdom only, were to insist upon the inhabitants relinquishing at once their native language, and adopting another of which they were utterly ignorant, it is hardly possible to imagine that his mandate would or could be obeyed; but if the despot's will were attempted to be complied with in his particular dominions, would all the rest of Europe burn their books, and set about learning a new alphabet, a new spelling-book, a new grammar, and the art of writing this new language? nothing but its general and universal adoption could render it useful to any one nation upon earth.

ROUSSEL, WILLIAM, a learned French Benedictine monk of the congregation of St. Maur, was born at Conches, a small town within the diocese of Evreux, in Normandy in the year 1658. He became a member of the congregation in the year 1680, and directed his attention principally to those studies which would qualify him for the office of a preacher. Having fine talents, he became very popular, and the general theme of commendation at Paris, but preferring retirement, he withdrew to Rheims, and afterwards to Argenteuil, where he spent the remainder of his life in devotion and study. He died in the year 1717. He published an excellent translation of the Letters of St. Jerome, in 3 vols. 8vo. the first two of which appeared in 1704; and the third, containing the critical letters of that father on the Holy Scriptures, in 1707. They are accompanied with a preface and learned notes. He was author of an *éloge* on father Mabillon. He had employed many years of his life in making preparations for composing "A Literary History of France," but death put an end to his labours, and his papers were placed in the hands of father Rivet, a member of the same congregation, who made use of them without acknowledging his obligation.

ROUSSELAER, in *Geography*, a town of France, in the department of the Lys, situated on the river Mandel; 10 miles S. of Bruges.

ROUSSIER, the *abbé*, in *Biography*, a profound writer on the theory of music, was born at Marseilles in 1716. He is author of a considerable number of musical tracts, of which the following are the titles:

1. A Treatise on Chords and their Succession, 1764.
2. Observations on different Points of Harmony, 1765.
3. Memoir on the Music of the Ancients, 1770.
4. A Letter, in two parts, to the author of the Journal of the Arts and Sciences, concerning the division of the zodiac, 1770. The second part to the same concerning the Institution of the Planetary Week, 1771.

5. Practical Harmony, or Examples in Illustration of the Treatise on Chords, 1776.

6. He was engaged, in 1779, as editor of a memoir on the music of the Chinese, by the abbé Amiot, missionary at Pekin. The learned abbé has enriched this memoir with a great number of notes, observations, and a copious index. See *CHINESE Music*.

All this profound writer's treatises are built upon the principles of Rameau, but Rameau sublimed. The abbé's favourite discovery and systematic principle is the triple progression, upon which he endeavours to prove that the musical systems of the Egyptians, Greeks, and Chinese were founded. By triple progression is meant a series of perfect fifths, so that the word temperament equally disturbs his system and his temper. It is to be feared that the good abbé in this particular, and in his principles in general, is too rigid and inflexible a theorist for the fanciful melody, and licentious modulation of modern composers.

The French are always to have champions, *une homme armé*, to combat the music and musical writers of all other countries. At the beginning of the last century, Bonnet was the redoubted champion of the votaries of Lulli in the middle of that century. The abbé Rouffier, with less fury, but more intelligence, threw down the gauntlet for Rameau and his *basse fondamentale*; and at the end of the century, the abbé Fautu, the most valourous and invincible of them all, has not only bid defiance to the enemies of Lulli and Rameau, but to the whole universe: a perfect Drawcansir, that spares nor friend nor foe, who dares be of a different opinion from himself.

ROUSSILLON, in *Geography*, a province of France before the revolution, once belonging to Spain, bounded on the N. by Languedoc, on the E. by the Mediterranean, on the S. by Catalonia, and on the W. by the Pyrenees, about 18 leagues in length, and 12 in breadth, and consisting of land that is generally fertile. Its principal rivers are the Tet and the Tech, and its capital is Perpignan. It now forms the department of the Eastern Pyrenees.

ROUSSILLON, a town of France, in the department of the Isère, and chief place of a canton, in the district of Vienne; 9 miles S. of Vienne. The place contains 963, and the canton 11,107 inhabitants, on a territory of 225 kilometres, in 21 communes.—Also, a town of France, in the department of the Saone and Loire; 9 miles N.N.W. of Autun.

ROUSSIN, in the *Manege*, is a strong well-knit, well-stowed horse, such as are commonly brought into France from Germany and Holland.

ROUSSING, in *Sea Language*, is the act of pulling together upon a cable, hawser, &c. without the assistance of tackles, capsterns, &c. It is particularly used in the exercise of removing a ship from one place to another, by means of ropes and anchors.

ROUT; ROUTE, a public road, highway, or course; especially that which military forces take.

The word is French, *route*, formed from the Latin *rupta*, or *ruta*; or the French *roux*, an old word for *horse*; or rather from the old Celtic *rout*, *road*.

Sanfon and Ogilby have made maps of the routs and post-roads of France and England. Soldiers are prohibited going out of their routs. Rout is frequently cut in parks, forests, &c. both for ornament, and for the conveniencies of hunting.

Some use route for a path cut across a wood; in opposition to *way*, which is a great road.

ROUT, in *Navigation*. See COURSE.

ROUT is also used for the defeat and flight of an army.

ROUT, in *Law*, is an assembly or combination of three or

more persons, upon a common quarrel, going forcibly to commit an unlawful act: such as breaking down fences upon a right claimed of common, or of way, though they do not actually perform it.

If they go, ride, or move forwards, after their meeting, thus making some advances towards the execution of their purpose, it is a rout, though they do not put their purpose in execution; if they do, it is a riot.

A rout, therefore, seems to be an unlawful assembly; and a riot the disorderly fact committed thereby.

Two things, however, there are in common to *rout*, *riot*, and *unlawful assembly*; the one, that there be at least three persons together; the other, that, being together, they disturb the peace, either by words, shew of arms, turbulent gesture, or actual violence.

For the punishment incurred by routs, &c. see RIOT.

ROUT of Wolves, among Hunters, denotes a herd of those wild beasts.

ROUTIER, in *Navigation*. See WAGGONER.

ROUTOT, in *Geography*, a town of France, in the department of the Eure, and chief place of a canton, in the district of Pontaudemer; nine miles E. of it. The place contains 1169, and the canton 14,721 inhabitants, on a territory of 110 kilometres, in 21 communes.

ROUTOU, a town of Thibet; 255 miles E.N.E. of Latac.

ROUVRAY, a town of France, in the department of the Côte d'Or; 11 miles S.W. of Semur en Auxois.

ROUVRE, a town of France, in the department of the Upper Marne; 15 miles S.W. of Langres.

ROUVRES, a town of France, in the department of the Vosges; four miles W. of Mirecourt.

ROUVROY, a town of France, in the department of the Somme; 15 miles E. of Peronne.

ROU-WADDE. See RUAD.

ROUX, CAPE, a cape of Africa, on the coast of Tunis. N. lat. 37° 10'. E. long. 8° 22'.

ROUXIERE, LA, a town of France, in the department of the Lower Loire; eight miles N.E. of Ancenis.

ROUY, a town of France, in the department of Nièvre; 15 miles E. of Nevers.

ROW, a town of Scotland, in the county of Dumbar-ton; nine miles W. of Dumbar-ton.—Also, a town of Hindoo-stan, in Bahar; 20 miles S. of Bahar. N. lat. 24° 55'. E. long. 85° 52'.

Row-Culture, in *Agriculture*, that method in which the crops are sown in rows or drills, and afterwards cultivated according to that system. See DRILL Husbandry.

This sort of cultivation is commonly divided into the narrow and distant kinds, the former comprising all sorts of grain, and some other kinds of crops, which are sown in rows at not more than six, eight, ten, and twelve inches apart; the latter, all those which have large spaces or intervals between the rows, as from a foot to a foot and a half, two feet and more, such as beans, peas, turnips, cabbages, beets, potatoes, carrots, parsneps, and many others. They all require to be wrought between suitable tools, such as hoes and ploughs, at different times, while they are growing upon the ground.

Row-Galley, a long, low, flat-built vessel, furnished sometimes with a deck, and navigated with sails and oars, particularly in the Mediterranean.

ROWAH, in *Geography*, a town of Hindoo-stan, in Bahar; eight miles N.W. of Bettiah.

ROWALE, or KOWALE, a town of the duchy of Warfaw; 36 miles S. of Wladislaw.

ROWAN, a county of America, and one of the most populous

populous of North Carolina, in Salisbury district; bounded N. by Iredell, and S. by Cabarrus, and containing 21,543 inhabitants.

ROWE, ELIZABETH, in *Biography*, a lady greatly distinguished for her piety and poetical talents, was daughter of the Rev. Walter Singer, a dissenting minister near Frome, in Somersetshire. Under the disgraceful reign of Charles II. this gentleman was imprisoned on account of his non-conformity at Ilchester, where he married, and where his daughter Elizabeth was born in 1674. From her childhood she discovered a passion for reading, together with a devotional turn of mind. At the age of twelve, she began to write verses, and practised music and drawing. Her poetical talents excited notice in the neighbourhood, and gave her an introduction to lord viscount Weymouth, by whose son, the honourable Mr. Thynne, she was instructed in the French and Italian languages. In her 22d year, at the request of her friends, she published a volume of miscellaneous poems, by which she is advantageously known. Possessing an agreeable person, and a large share of the accomplishments of her sex, she attracted the attentions of many admirers, but she appears to have been in no hurry to marry, and it was not till 1710 that she gave her hand to Mr. Thomas Rowe, a very amiable man, a scholar, and a poet, with whom she lived in the enjoyment of a large portion of conjugal felicity. This happiness was not lasting; Mr. Rowe, who was of a consumptive habit, died at Hampstead in 1715, and left his widow overwhelmed with grief, which nothing but her sentiments of pious resignation could enable her to support. From this time she passed her days, for the most part, in retirement at Frome, but making occasional visits to the countess of Hertford. Her manners and attainments rendered her perfectly suited to the best company; and though she adhered to the last to the principles of the Dissenters, she was entirely free both from narrowness of sentiment, and from any forbidding austerity of behaviour. Mrs. Barbauld has, in a few lines, given the manner in which she employed herself, and the persons with whom she associated.

“ Yet in no useless gloom she wore her days,
She loved the work, and only shunned the praise;
Her pious hand the poor, the mourner, blest;
Her image lived in every kindred breast,
Thynne, Carteret, Blackmore, Orrery approved,
And Prior praised, and noble Hertford loved.
Seraphic Kenn, and tuneful Watts were thine,
And Virtue's noblest champions filled the line.”

Mrs. Rowe composed several works in her retreat, especially those letters from the dead to the living, which her own heavy loss doubtless had suggested. She was blessed with a good constitution, and passed through life with very little interruption of health. She died suddenly in February 1737, in the 63d year of her age. A pious book was found lying open by her, and in her cabinet were found letters to several of her friends, which she intended for them after her death. Her works were, “The History of Joseph,” an heroic poem; “Friendship in Death,” &c.; “Devout Exercises of the Heart;” “Miscellaneous Works,” in two volumes. Few characters have been more justly esteemed than that of Mrs. Rowe. With respect to her poetical works, the general character is correct and melodious versification, flowing language, and tender elevated sentiments. Among her prose compositions the most popular was that entitled “Friendship in Death, in twenty Letters,” supposed to be written from the dead to the living. These are the works of a lively and a feeling heart, exercised in pious meditations, and they are always read with pleasure by the

young, and those who are susceptible of good impressions. They have passed through many editions, and are usually accompanied by other pieces of the author's of a moral and religious kind. All her writings, though not calculated to stand the test of exact criticism, inspire a favourable idea of the writer.

ROWE, THOMAS, the husband of the foregoing, was the son of a dissenting minister, who afforded him all the advantages of an excellent education, and he would probably have become a distinguished literary character, had not his early marriage been followed by a premature death. He wrote some excellent pieces of poetry, one of which was a tender ode to his wife, some years after their marriage. History was his favourite pursuit, and he formed a design of writing the lives of illustrious characters in antiquity, omitted by Plutarch, of which eight were finished, and were published after his death. He died in 1715, at the age of 28. Some of his original poems and translations were printed with Mrs. Rowe's “Miscellaneous Works.”

ROWE, NICHOLAS, an eminent English poet, the son of John Rowe, esq. serjeant at law, was born in 1673, at Little Berkford, in Bedfordshire. After a preliminary education at Highgate, he was placed in Westminster school under the noted Dr. Busby, as a king's scholar, and pursued classical studies with eagerness and success. His poetical exercises in Latin and Greek were particularly admired. He was removed from school at the age of 16, and entered a student in the Middle Temple, and proceeded so far in the pursuit of the law, as to be called to the bar; but the death of his father, when he was only 19, gave him liberty to follow his own inclination, and he devoted himself to poetry and polite literature. At the age of 25 he produced his first tragedy, entitled “The Ambitious Step-mother;” the story of which appears to be founded on that of Solomon elevated to the throne by the machinations of his mother Bathsheba, but the scene and circumstances are totally different. It was acted at Lincoln's Inn-Fields, and was very successful, which is said to have rendered the author a decided deserter from the law. His next dramatic work was “Tamerlane,” which was acted in 1702. This was intended to convey important political impressions: the tyrant and despot Bajazet being intended as the type of Lewis XIV., then considered as the enemy of liberty, civil and religious, and the Tartar Tamerlane was metamorphosed into a perfect prince, intended to characterize the immortal William III. of England. In all the portraits there was much exaggeration, but the purpose of the piece, and its many elevated and liberal sentiments, caused it to be received with great applause. It was frequently acted during that and the following reign, till the year 1710, when different political opinions coming into fashion, it was for a time intermitted, but the accession of the house of Hanover restored it to the stage, and it was for a great number of years represented on the anniversary of king William's landing. In 1703, Mr. Rowe produced his “Fair Penitent,” which is thought to be his most striking piece; it is highly interesting, and abounds with poetry and fine sentiments. Mr. Rowe made an attempt at comedy in 1706, but did not succeed. From this time to 1715, he brought out, in succession, the tragedies of “Ulysses;” “The Royal Convert;” “Jane Shore,” and “Lady Jane Gray.” Of these, the two last have survived on the stage. Jane Shore is now occasionally acted; always when performed engages some of the best actors, and never fails to be viewed with the deepest interest. During this interval he appeared as an editor of Shakspeare's plays, prefixing to this edition an account of the life of that transcendent genius. Rowe was not exclusively engaged in literary pursuits,

he was a man of business, and did not neglect those opportunities of entering into public life, which his reputation and connections afforded. He had joined the Whig party, and when the duke of Queensberry was made secretary of state, he was appointed by that nobleman his under secretary. This post he held about three years, when the duke died, and his services were no more required during the reign of queen Anne. It is said he went, one day, to pay his court to the lord-treasurer Oxford, who asked him if he understood the Spanish language. He replied in the negative, but added, that he did not doubt but he could make himself master of it, supposing his lordship intended to give him employment at the court of Madrid. The earl seemed to approve his intention of studying the language: Rowe took his leave, and retired a few weeks or months to learn it, and then waited on his lordship to acquaint him with what he had done: "then, sir," replied the courtier, "I envy you the pleasure of being able to read Don Quixote in the original," and dismissed him. On the accession of George I. the place of poet laureat was conferred upon him, and he was also made one of the land surveyors of the customs of the port of London. The prince of Wales conferred upon him the clerkship of his council, and the lord chancellor Parker made him his secretary for the presentations. The emoluments of these offices, with his own fortune, enabled him to support a very respectable station in society, but he did not live long to enjoy these accessions to his fortune. He died in 1728, at the age of 45, and was interred among the poets in Westminster-Abbey. Mr. Rowe was twice married, and had a son by his first wife and a daughter by the second. He was a handsome and genteel man; and his mind was as amiable as his person. He lived beloved, and at his death was lamented by Pope, in an epitaph which is to be found in Pope's works, though it is not affixed on the monumental marble at Westminster. Mr. Rowe is chiefly known to the public as a tragic poet; if he does not possess in a very high degree the principal parts of tragic invention, such as the nice discriminations of character, and the skilful development and varied play of passion; his diction is poetical without being bombastic or affected, his versification is singularly sweet, and his plays abound with sentiments, given with such force and elegance as are calculated to dwell upon the mind. In his *Jane Shore* he professes to be the imitator of Shakspeare, but nothing can be more dissimilar than the mode and colour of writing in the two poets, as nothing could be less resembling than their genius. Mr. Rowe is well known also by his poetical translations. He gave versions of the Golden Verses of Pythagoras, and of the first book of Quillet's "Callipædia," see *QUILLET*; but his chief labour in this way was a translation of Lucan's "Pharsalia," which was not published till 1728, ten years after the translator's death, and which Dr. Johnson calls "one of the greatest productions of English poetry;" but if critically compared with the original, it will be found frequently very diffuse. The "Poetical Works" of Mr. Rowe, consisting of his plays and miscellaneous poems, were published collectively in three vols. 12mo. in 1719; and his translation of the *Pharsalia* was published soon after his death, with a dedication to the king by his widow.

ROWE, in *Geography*, a township of America, in the N.W. corner of Hampshire county, Massachusetts, bounded N. by Vermont; watered by Deerfield river, and containing 839 inhabitants; 115 miles N.W. of Boston.

ROWEL, among *Farriers*, a kind of issue, made by drawing a skain of silk, thread, hair, or the like, through the nape of the neck, or other part of a horse; answering to what in surgery is called a *seton*.

The ROWELLING of Horses is a method of cure frequently had recourse to, in cases of inward strains, especially about the shoulders or hips; as also for hard swellings not easily to be resolved.

The operation is thus: a little slit being made through the skin, about a hand's breadth below the part aggrieved, big enough to put a swan's quill in; the skin is raised from the flesh, the end of the quill put in, and the skin blown from the flesh upwards, and all over the shoulder.

Then the hole being stopped by the finger, the place blown is beaten with a hazel stick, and the wind spread with the hand all over, and then let go.

This done, a skain of horse-hair, or red sarfenet, half the thickness of the little finger, is put in a rowelling needle seven or eight inches long; the needle is put into the hole, and drawn through again six or seven inches higher; then the needle is drawn out, and the two ends of the rowel tied together; anointing it every day, as well as before the putting it in, with sweet butter and hog's grease, and drawing it backwards and forwards in the skin, to make the putrid matter discharge itself more plentifully.

Others, disliking these rowels, as making too great a fore and scar, use the French rowel, which is a round piece of stiff leather, with a hole in the middle, laying it flat between the flesh and skin; the hole of the rowel just against that in the skin; sewing it with a needle and thread drawn through the hole in the skin; cleaning it once in two or three days, and then anointing it afresh.

ROWELS of a Spur. See *SPUR*.

ROWEN, in *Geography*, a town of Bohemia, in the circle of Chrudim; 10 miles S.E. of Chrudim.

ROWEN-Tree, in *Husbandry*, a term improperly applied to the mountain ash.

ROWENSKO, in *Geography*, a town of Bohemia, in the circle of Boleslaw; 6 miles S.E. of Turnau.

ROWET, a name sometimes applied to rouen. See *ROUEN*.

ROWETY-WOOL, among wool-dealers, a term applied to the young wool of some sorts of sheep, which rises below the old fleece.

ROWING, is the action of impelling a boat or vessel along the surface of the water by oars, which are managed in a direction nearly horizontal. See *OAR*, *BOAT*, &c.

ROWING-Guard. See *GUARD-Boat*.

ROWLE, in a *Ship*, is a round piece of wood or iron, in which the whip goes, being made to turn about, that it may carry over the whip the easier from side to side.

ROWLEY, in *Biography*, a monk, who is said to have flourished at Bristol in the 15th century, and whose poems, or those attributed to him, were published, many years ago, by the unfortunate *CHATTERTON*. See his article.

ROWLEY, WILLIAM, who stands in the third class of dramatic writers, lived in the reign of James I., and was one of the company of players belonging to the prince of Wales. Little is known of him, except that he was in close connection with all the principal wits and poetical geniuses of that age, with some of whom he joined in their writings. By Wood he is styled "the ornament for wit and ingenuity of Pembroke-hall, Cambridge." He was a considerable benefactor to the English stage, having left five plays of his own composing, and lent his assistance to several authors in the composition of many others. The titles of all these are given in the *Biographia Dramatica*; which see.

ROWLEY, in *Geography*, a town of Hindoostan, in Oude; 18 miles S. of Bahratch.

ROWLEY, a township of America, in Essex county, Massachusetts;

ROWLEY RAG.

fachufetts; the inhabitants, amounting to the number of 1682, are mostly farmers; incorporated in 1639, and situated 4 miles N.W. by W. of Ipswich.

ROWLEY Rag, in *Mineralogy*, a basaltic stone from Rowley, near Dudley, in Staffordshire. It is used for polishing in some of the manufactures of Birmingham, and has been particularly recommended for grinding the specula of reflecting telescopes. On this variety of basalt, the fine-grained grunstein of Werner, some most interesting experiments were made by the late Mr. Gregory Watt, to determine the important question respecting the igneous or aqueous origin of basaltic rocks. Perhaps few experiments in the last fifty years throw more light on some of the mysterious operations of nature in the mineral kingdom, and have a better claim to the profound attention of philosophers, or are more deserving of being repeated and diversified. (See *Phil. Trans.* for 1804, p. 279.) Before a short account of these experiments, it may be proper to give a description of the stone itself. Rowley rag is a species of fine-grained basalt, of a confused crystallized texture; its fracture, in small pieces, is uneven; in the large, conchoidal. Its hardness is superior to common glass, but inferior to feldspar; its tenacity is considerable; its action on the magnetic needle is strong, but without signs of polarity; its specific gravity is 2.868. The general colour of Rowley rag is a very dark grey, approaching to black: it reflects light from a variety of brilliant points, some of which seem to be feldspar, the others hornblende. According to the analysis of Dr. Withering, 1000 parts contain 475 silex, 325 argillaceous earth, and 200 of the oxyd of iron. The magnetic property of these rocks was first observed by Dr. Plott, who says they turned the needle 6° from its proper direction. The same power of affecting the magnet has since been discovered in several basaltic mountains, particularly in the Giant's Causeway in Ireland. This stone is similar to the basalt of the Clee hills, in Shropshire, and the basaltic stones in various parts of Great Britain. In its characters and chemical composition it nearly resembles some of the compact lavas from *Ætna* and *Teneriffe*. It is easily fusible into an opaque black glass, which, however, transmits light through very minute fragments. The texture of this glass is completely vitreous, with a few air-bubbles. Its fracture is conchoidal and undulated; the hardness is superior to feldspar, but inferior to quartz. This glass possesses scarcely any action on the magnetic needle. The specific gravity is 2.749.

For the purpose of ascertaining the effect of a high degree of temperature on a considerable quantity of this stone, one of the common reverberatory furnaces, used in iron foundries for the fusion of pig-iron, was strongly heated by a fire maintained several hours. About seven hundred-weight of amorphous Rowley rag was broken in small pieces, and deposited gradually on the elevated part of the interior of the furnace, between the fire and the chimney; from whence, as it melted, it flowed into the deeper part, in which, in ordinary operations, the iron is collected. It was observed by the persons attending, that it did not require half the quantity of fuel to fuse the basalt that would have been necessary to melt an equal weight of pig-iron. When the whole was melted, it formed a liquid glass, rather tenacious, from which a large ladleful was taken, which, being allowed to cool, retained the characters of perfect glass. The fire was maintained, though with gradual diminution, for more than six hours; after which time, the draught of the chimney was intercepted, the surface of the glass was covered with heated sand, and the furnace was filled with coals, which were consumed very slowly. It was eight

days before the mass in the furnace was sufficiently cool to be extracted, and even then it retained considerable heat.

The form of the mass being given by the bottom of the furnace, approached to the shape of a wedge. It was nearly three feet and a half long, and two feet and a half wide; about four inches thick at one end, and above eighteen inches at the other. Owing to this inequality of thickness, and also to the unequal distribution of heat in the furnace, Mr. Watt states that the cooling of the mass had been too irregular to permit it to attain an homogenous texture; but this circumstance fortunately disclosed some very remarkable peculiarities in the arrangement of the particles of bodies, passing from a vitreous to a stony state.

These peculiar changes were discovered, by inspecting the various parts of the wedge-shaped mass, which had progressively cooled, as they were more remote from the fire, and nearer to the small extremity. This circumstance, not being very distinctly stated by Mr. Watt, has led some of the readers of the paper to believe that the changes were observed by taking a portion of the substance out of the furnace at different times, during the process: hence they have not sufficiently attended to a most important fact which this experiment discloses, namely, that the particles of bodies in a solid state, and at a temperature much below that of fusion, are capable of a kind of internal motion, and of assuming a crystalline arrangement, in all the various stages from fluidity to a perfectly solid state.

The tendency towards arrangement in the particles of the fluid glass is first developed by the formation of minute globules, which are generally nearly spherical, but sometimes elongated, and which are thickly disseminated through the mass. The colour of these globules is considerably lighter than that of the glass; they are commonly greyish-brown, sometimes inclining to chocolate-brown; and when they have been formed near the interior surface of the cavities in the glass, they project and resemble a cluster of small seeds. Their diameter rarely exceeds a line, and seldom attains that size; as, in general, they are so near to one another, that their surfaces touch before they can acquire considerable magnitude. In the process of cooling, they adapt their form to their confined situation, fill up every interstice, and finally present a homogenous body, wholly unlike glass, and equally unlike the parent basalt. When the union of the little globules has been imperfectly effected, the fracture of the mass indicates its structure, by numerous minute conchoidal fractures, which display the form of each globule. But if the arrangement has extended a little farther, all these subdivisions are entirely lost; the mass becomes perfectly compact, has an even or a flat conchoidal fracture, is nearly of the same hardness as the glass, is commonly of a chocolate colour, graduating into a brownish-black, and the intensity of the colour increases in proportion to the degree to which the arrangement has extended. Its aspect is rather greasy; and it much resembles some varieties of jasper, in the compactness of its texture, and its opacity. Its magnetic action is extremely feeble. Its specific gravity appears to be 2.938. From this resemblance to jasper, Mr. Watt denominates the mass in this state jaspideous.

If the mass were now rapidly cooled, it is obvious, says Mr. Watt, that the result would be the substance I have just described; but if the temperature adapted to the farther arrangement of its particles be continued, another change is immediately commenced; by the progress of which it acquires a more stony texture, much greater tenacity, and its colour deepens as these changes advance, till it becomes absolutely black. Sometimes this alteration is effected

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effected by a gradual transition, the limits of which cannot be assigned; but more generally by the formation of secondary spheroids, in the heart of the compact jaspideous substance. These spheroids differ essentially from those first described: the centres of their formation are more remote from each other, and their magnitude is proportionably greater, sometimes extending to a diameter of two inches, and seeming only to be limited by contact with the peripheries of other spheroids. They are radiated with distinct fibres: sometimes the fibres resemble those of brown hæmatites, and sometimes they are fasciculated irregularly, so as to be very similar in appearance to the argillaceous iron ores, rendered prismatic by torrefaction. They are generally well defined, and easily separable from the mass they are engaged in; and often the fibres divide at equal distances from the centre, so as to detach portions of the spheroid in concentric coats. The transverse fracture of the fibres is compact and fine-grained; the colour black; and the hardness somewhat inferior to that of the basaltic glass. When two of the spheroids come in contact by mutual enlargement, no intermixture of their fibres seems to take place: they appear equally impenetrable; and as neither can penetrate, both are compressed, and their limits are defined by a plane, at which a separation readily takes place, and each of the sides is invested with a rusty colour. When several spheroids come in contact on the same level, they are formed by mutual pressure into pretty regular prisms, whose division is perfectly defined; and when a spheroid is surrounded on all sides by others, it is compressed into an irregular polyhedron.

The transition from this fibrous state to a different arrangement, seems to be very rapid, for the centre of most of the spheroids becomes compact before they attain the diameter of half an inch. As the fibrous structure propagates itself by radiating into the unarranged mass, the compact nucleus, which supplies its place, gradually extends till it finally attains the limits of the spheroids; and the same arrangement pervades the matter comprehended between them. The mass has now assumed a compact stony texture, and possesses great tenacity. Its hardness is somewhat inferior to that of the glass from which it was formed. Its action on the magnetic needle is very considerable. Its specific gravity is 2.938. Its colour is black, inclining to steel grey; it is absolutely opaque, and only reflects light from a few minute points. Though the divisions between the spheroids are rendered imperceptible to the eye, they are not obliterated, and their rusty surfaces are often disclosed by an attempt to fracture the mass.

A continuation of the temperature favourable to arrangement speedily induces another change. The texture of the mass becomes more granular, its colour rather more grey, and the brilliant points larger and more numerous; nor is it long before these brilliant particles arrange themselves into regular forms; and finally the whole mass becomes pervaded by thin crystalline laminae, which intersect it in every direction, and form projecting crystals in the cavities. The hardness of the basis seems to continue nearly the same; but the aggregate action of the basis and of the imbedded crystals on the magnetic needle, is prodigiously increased. It appears to possess some polarity, and minute fragments are suspended by a magnet. Its specific gravity is somewhat increased, as it is now 2.949. The crystals contained in it, when examined by a microscope, appear to be fasciculi of slender prisms, nearly rectangular, terminated by planes perpendicular to the axis; they are extremely brilliant, but their colour is greenish-black; they are harder than glass, and fusible by the blowpipe; they are suspended by the action of a magnet.

They are arranged nearly side by side, but not accumulated in thickness, so that they present the appearance of broad thin laminae; they cross one another at all angles, but always on nearly the same plane; and the laminae thus formed are often three or four lines long, and from a line to a line and a half broad, but extremely thin.

It seems obvious that an equalized temperature would have rendered the whole similar to the substance last described; and it may be fairly inferred, that by a continuance of heat the minute crystals would have been augmented in their dimensions by the accession of similar particles still engaged in the basis, or by the union of several crystals, till they acquired sufficient magnitude for their nature to be absolutely determined by the usual modes of investigation. It is possible, however, if such precautions had been taken as might have secured this degree of perfection in the ulterior result, that the mass would only have exhibited an uniform aspect, and that the interesting initial phenomena would not have been discovered.

The appearances here described seem deserving of consideration in several points of view. Few things can be more at variance with commonly received opinion, than the diversified succession of changes of structure which this glass exhibits in its passage to a crystallized state. The generation of the globules which unite to form the jaspideous substance, is what we might be prepared to expect by observing the cooling of a common iron furnace slag. But it appears not very obvious to common apprehension that the species of arrangement requisite to form this intermediary substance, could be compatible with any fluidity permitting farther motion of the ultimate particles of the mass; yet immediately after the completion of this arrangement, they receive a new disposition, and the radiated fibrous structure commences. Sometimes this pervades even the unaltered glass; but Mr. Watt presumes this only to happen where the minute globules first formed were scattered so far asunder that their centres became fibrous before their peripheries came into contact. This view of the subject is justified by the analogous operation of the formation of crystals similar to those described in the heart of the radiated spheroids, while their exterior still retained the fibrous texture.

If it be considered as extraordinary that a change should be effected, converting an apparently solid and homogeneous mass into an accumulation of radiated spheroids, and that these radii should lose their fibrous structure, and assume the texture, aspect, and tenacity, of a compact, hard, and homogeneous stone, it is certainly much more extraordinary that this stone should permit farther arrangement to proceed, and should enable the crystalline molecules which it contains in a state of confused aggregation, to arrange themselves, and to form regular crystals, which, although minute, are equal, in the perfection of their forms, and in the brilliancy of their natural polish, to the most precious products of crystallization. It is also well deserving of observation by how regular a march the magnetic influence of the substance keeps pace with the perfection of its arrangement, till it becomes so powerful that fragments of the regenerated stone are suspended by the magnet.

It has been most justly remarked by Mr. Smithson, that solution, far from being necessary to crystallization, effectually prevents its commencement; for while solution subsists, crystallization cannot take place. It may remain a question whether previous solution be essential as a preparatory means of obtaining, by subsequent evaporation or cooling, the small parts of bodies disengaged, so that they may unite to form regular crystals. If, by solution be only meant that simple action of heat, or water, which merely counteracts

teracts the force of aggregation, and relieves the molecules from their bonds of union with each other, it certainly is a requisite; but if by solution be meant that action of affinities, by which not only the force of aggregation is overcome, but the combinations which constitute the molecules are destroyed, it obviously is not only unnecessary, but prejudicial, to crystallization. Mechanical suspension in a fluid medium of such density that the crystalline polarity may be enabled to counteract the power of gravity, is, with justice, considered by Mr. Smithson the only requisite for the formation of crystals. The circumstances here detailed appear an additional confirmation of this remark, and perhaps go still farther, by shewing that even the fluidity (in the common sense of the word) of the suspending medium is not an indispensable condition. For it appears impossible to annex the idea of fluidity to the union of the minute globules which form the jaspideous substance, still less to that substance when formed, or to those spheroids whose obstinate impenetrability is so strongly defined. And if, by any power of imagination, these can be supposed to be fluid at the time they retain this conformation; how can it be supposed that the compact, hard, tenacious stone into which they are changed, could retain these characters in a fluid state? Yet the subsequent formation of crystals proves that either all these contradictions must be, or that the particles of bodies apparently solid, must be capable of some internal motion, enabling them to arrange themselves according to polarity, while they are solid and fixed, as far as they have reference to the ordinary characters of fluidity.

Instances, even more remarkable, of the motion of the particles of bodies in a solid state, have very long been known and authenticated, though perhaps they have not been generally regarded with the attention they deserve. Glass vessels are well known to be convertible into Reaumur's porcelain by the internal arrangement of their particles without losing their external form, and consequently at a temperature very much below that requisite for their fusion. The change of glass into Reaumur's porcelain does not arise from an evaporation of the alkali, as has been alleged, but from a regular arrangement of the particles of the glass. It commences by the formation of fibres perpendicular to the surface of the glass, and penetrating into it. At nearly the same time small radiated globules are formed in the interior of the glass, and the union of these with the fibres, by their mutual increase, forms the whole into a new substance; and if the requisite temperature be longer maintained, the fibres disappear, and the whole becomes fine-grained and almost compact. This substance, from the improved state of its aggregation, is much stronger and more tenacious than before, and is not fusible at a heat sufficient to fuse the glass it was formed from; but if that aggregation be once destroyed, the glass resulting from its fusion is equally fusible with the original glass; and a repetition of the process will again form Reaumur's porcelain, which may be again fused, and so on repeatedly; for the quantity of alkali evaporated during the operation is extremely small. The hardness and brittleness of metals rapidly cooled, contrasted with the softness and tenacity resulting from their gradual refrigeration, are all analogous instances; and all the processes in which annealing is employed, and more remarkably the tempering of steel, offer strong proofs of the internal motions and arrangements of the particles of matter at temperatures very much below the heat requisite for their fluidity. Mr. Watt further adduces the structure and texture of calcareous stalactites as offering proofs of the internal motion of the particles of solid bodies at the common temperature of the atmosphere. Successive depositions of cal-

careous carbonate form a stalactite which at first is fibrous. A continuance of the process causes the fibrous structure to disappear, and the stalactite becomes irregularly crystalline. The irregularities afterwards vanish, and it becomes perfect calcareous spar, divisible into large rhomboids, with the form peculiar to that mineral, and all the gradations may be found in the same specimen. For a more particular account of these experiments, and the ingenious observations of Mr. Watt, we must refer the reader to the volume of the Philosophical Transactions above cited. The proofs and illustrations of the arrangements which take place in the internal particles of solid bodies, offer the only plausible explanation, which has yet been given, of the formation and decomposition of crystals under various circumstances in which they occur in mineral veins, and also of the prismatic forms observable in currents of lava, and in basaltic and other rocks. See TRAP, and VOLCANIC *Products*.

ROW-LOCKS, among *Ship-Carpenters*, small spaces left in the gunwale, where two tholes are let in, at such a distance from each other, as to admit the oar, at the end of the loom, to lie on to row the boat.

In the sides of the smallest vessels of war, a number of little square holes, called *row-ports*, are cut for this purpose parallel to the surface of the water.

ROWNING, JOHN, in *Biography*, an English mathematician and philosopher of considerable ingenuity, was fellow of Magdalen college, Cambridge, and afterwards rector of Anderby, in Lincolnshire. He was chiefly known for mechanical contrivances and inventions. In 1738 he published a compendious system of natural and experimental philosophy, in 2 vols. 8vo. which was frequently referred to thirty or forty years ago, and which has passed through many editions, but is now superseded by many other similar works of more value. He has likewise two pieces in the Philosophical Transactions, one containing a description of a barometer, in which the scale of variation may be increased at pleasure; the other, giving directions for making a machine for finding the roots of equations universally. He published likewise "A Preliminary Discourse on the Fluxionary Method." Mr. Rowning died in November 1771, in the 72d year of his age.

ROWRAH, in *Geography*, a town of Hindoostan, in the circar of Gohud; 10 miles S. of Raat.

ROWS of Trees. See PARALLELISM.

ROWSING, in *Sea Language*, denotes pulling upon a cable or rope, without the assistance of capsterns, &c.

ROWT, in *Rural Economy*, a term signifying to low as cattle.

ROWTEE, in *Geography*, a town of Hindoostan, in the circar of Sumbul; 15 miles S.S.W. of Nidjibabad.

ROWTOMPOUR, a town of Hindoostan, in Oude; 16 miles S.S.W. of Kairabad.

ROWTY, in *Agriculture*, a term signifying over-rank, or too strong.

ROXBOROUGH, in *Geography*, a township of Philadelphia county, in Pennsylvania.

ROXBURGH, a village in Roxburghshire, Scotland, was formerly a place of considerable importance, as may be conjectured from the circumstance of its having given name to the county. It was for several centuries a royal burgh; and was regarded as one of the first towns in the Scottish kingdom, for opulence, and magnificence of appearance. It was totally destroyed by king James II., and never afterwards recovered; and as its site is now converted into arable fields, the plough has nearly obliterated all traces of its existence. Some remains of its ancient castle, however, are yet visible about two miles eastward from the village. These

These occupy the summit of a bold eminence, which rises from the plain, near the junction of the Tweed and the Teviot. This fortress, in ancient times, was of great strength, and was accounted the most important strong-hold on the Scottish borders. It was environed by a deep ditch, which could be filled at pleasure by the garrison with the waters of the Teviot, and over which a drawbridge was thrown. Interior to the ditch was a wall, of which only a few fragments are standing, but enough to attest its prodigious thickness and solidity. Roxburgh castle, Pennant informs us, in his Tour in Scotland, was anciently called Marchidon, Marchmont, or the Hill on the Marches. The name of its founder is unknown, as is the period of its erection. The earliest mention of it in history occurs in 1132, when a treaty of peace is stated to have been concluded here, between king Stephen of England and king David I. of Scotland. In 1174, after king William the Lion was made a prisoner by the English, this castle, with four others, was delivered up to king Henry II. as a security for his royal hostage doing homage for his crown on his release from captivity. The successor of Henry restored it to the Scots, but it was again taken by king Edward I. in 1296. It was recovered doubtless by king Robert I., but appears to have been soon after possessed by the English, as it is recorded to have been surpris'd, in 1342, by sir Alexander Ramsay, who was appointed governor; an honour which the envious Douglas did not allow him to enjoy long. The Scots again lost this fortress in the reign of Edward III., who twice celebrated his birth-day here. After this period it was taken and retaken several times; but the most distinguished siege was that by king James II., when it was captured by the Scots; though, previous to the victory, the king was killed by the bursting of a piece of ordnance. A hollow tree is said to stand on the spot where the monarch fell, on the north side of the Tweed, and at a short distance below Fleur's house. The queen, who was with the army when this event took place, observing that the soldiers were disheartened, and that the commanders were disposed to raise the siege, used every exertion to excite their courage; and, among other things, told them, that though their king had fallen, he was but one man, and that she would soon give them another king, her son, James III., who next day arrived in the camp, and was crowned at Kelso, in the 7th year of his age. This heroic and well-timed address produced the desired effect; the spirits of the whole army were roused, and the attack having been renewed with redoubled ardour, the garrison surrendered in a few days. From that period the castle has remained in ruins, though it was in some degree repaired by the lord protector, Somerset, in the reign of Edward VI. of England.

The parish of Roxburgh extends eight miles in length, and about four in breadth. The general appearance is flat and sloping, and the soil is generally a rich loam, well calculated, either for the growth of wheat, or for the turnip husbandry. According to the parliamentary returns of 1811, it contains 225 houses, and 946 inhabitants. The Statistical Account of Scotland, by sir John Sinclair, bart. vol. x. 1797. Pennant's Tour in Scotland, vol. iii. 4to. 1779. Beauties of Scotland, vol. ii. 8vo. 1805.

ROXBURGHIA, in *Botany*, received that name, at the suggestion of the right honourable sir Joseph Banks, from the pen of the late Mr. Dryander, in just commemoration of the discoverer of this genus, Dr. William Roxburgh, F.L.S., member of the Asiatic Society. The researches of this indefatigable and enthusiastic observer of nature, among the botanical treasures of Hindoostan, and his liberal communications to his friends at home, have added very extensively

to our knowledge of Indian plants. The East India Company have published his *Coromandel Plants* in a style worthy of the materials. From the remote situation of the author, many genera and species were left by him for the determination of his learned editor, to whom all the sources of literary information in Europe were open. But as the name of this editor is entirely kept out of sight, a French writer, De Theis, has been led into the mistake of charging Dr. Roxburgh with the unexampled arrogance of dedicating a genus to his own honour. No man can be further, than our candid and unassuming friend, from such presumption, and we feel it a duty to wipe away the unmerited reproach—Dryand. in Rox. Coromand. v. 1. 29. Willd. Sp. Pl. v. 2. 321. Ait. Hort. Kew. v. 2. 347. Sm. Exot. Bot. v. 1. 111.—Class and order, *Tetrandria Monogynia (Oëandria*; in Hort. Kew.) Nat. Ord. *Sarmentaceæ*, Linn. *Aspæregi*, Juss.

Gen. Ch. *Cal.* none, unless the corolla be taken for such. *Cor.* Petals four, inferior, lanceolate, equal, ribbed, coloured chiefly on the upper side, permanent. *Stam.* Filaments four, opposite to the petals, and nearly as long, awl-shaped, fleshy, with a double cell at their inner side, near the base; anthers two-lobed, oblong, lodged in the cells of the filaments, and each crowned with a simple lanceolate appendage, much shorter than the naked summit of the filaments. *Pist.* Germen superior, small, sessile, ovate; style none; stigma roundish. *Peric.* Capsule of one cell, with two concave valves. *Seeds* numerous, erect, cylindrical, furrowed, each supported on a stalk clothed with little vesicles.

Ess. Ch. Petals four, spreading. Filaments lanceolate, keeled, bearing the anthers on their inside, near the base, crowned with an appendage. Capsule superior, of one cell, with two valves, and many seeds.

1. *R. viridiflora*. Green-flowered Roxburghia. Sm. Exot. Bot. v. 1. 111. t. 57. (*R. gloriosoides*; Dryand. in Ait. Hort. Kew. v. 2. 348. Roxb. Coromand. v. 1. 29. t. 32? *R. gloriosa*; Curt. Mag. t. 1500. *Ubiu* *polypoides album*; Rumph. Amb. v. 6. book 9. 364. t. 129.)—Native of low moist woods and thickets in the valleys of Hindoostan and Amboyna, flowering in the cold season. Roots being sent by Dr. Roxburgh to the late lady Amelia Hume, they bore flowers in April 1805, for the first time in Europe. Each root consists of many oblong fleshy knobs. The stem climbs spirally to the height of many feet, without tendrils, and is branched, angular, smooth and leafy. Lower leaves alternate to the height of five feet, the rest opposite; all spreading, on smooth, channelled footstalks, ovate or partly heart-shaped, pointed, entire, smooth, thin and pliable, with about seven or nine ribs, and innumerable fine transverse veins. *Stipulas* none. *Flower-stalks* axillary, solitary, shorter than the leaves, smooth, deflexed, racemose, each bearing two, three, or four flowers. *Bractæas* lanceolate, solitary, under each partial stalk. *Flowers* ascending, large, fetid like corrupted water, or the Stinking Morel. (See PHALLUS.) *Petals* near two inches long, coriaceous, green, with purplish ribs, especially on the upper side. *Stamens* violet in the lower part; their points green. The pollen, consisting of highly polished globules, falls to the bottom of the flower, rolling about like quicksilver.

The figure given by Dr. Roxburgh differs from our plant, in having much smaller flowers with tawny petals, and yellow anthers. He thinks it likely that there may be more than one species of this genus, which he did not distinguish in India. Rumphius describes two, his *Ubiu polypoides album* and *nigrum*. The former seems best to agree with our plant, except that his figure has solitary flowers. He says its stems extend to the length of 100 fathoms, and that the

roots, previously prepared with lime-water, are candied with sugar, and taken with tea. Their flavour is insipid.

Our friend Dr. Sims, in Curtis's Magazine, while he follows the ideas of preceding authors respecting the characters and affinities of this singular plant, avows a preference for the very different view which we have taken; and we derive much confidence from his sanction. It is to be regretted, that, with the best possible intention, he has been misled by the French botanists, to change a faulty specific name much for the worse. The word *gloriosa*, whether designedly or not, serves but to perpetuate their unjust ideas of Dr. Roxburgh, as having, by an unexampled instance of *vain-glory*, inscribed a genus to himself. We most wonder at Dr. Sims's continuing to apply a specific name which, by his own confession, appears to belong to a different plant, whose flowers are "hardly half the size." For this, the original species, we would, as the least evil that presents itself, retain the name of *gloriosiformis*, which is at least correct, and very expressive. We had long ago detected Rumphius's synonym. It agrees best with our *viridiflora*.

ROXBURGHSHIRE, in *Geography*, one of the southern counties of Scotland, is situated between N. lat. $55^{\circ} 7'$, and $55^{\circ} 42'$, and between W. long. $1^{\circ} 39'$, and $2^{\circ} 36'$, from the meridian of London. It is bounded on the south by Cumberland and Northumberland, in England; on the east by the latter county only; on the north and north-east by Berwickshire; and on the west and north-west, by the counties of Dumfries, Selkirk, and Midlothian. In point of shape, it is so extremely irregular, that it is difficult to define its extent. Its greatest length, from the junction of the Mare-burn with the Liddel, to the junction of Carham-burn with the Tweed, is 41 miles; and its greatest breadth, on a line intersecting the above at right angles, is 29 miles. Its medium length is about 30, and its medium breadth a little more than 22 miles, making its contents about 672 square miles, or 430,080 square acres; of which, at the time of the last survey, in 1796, nearly three-fifths were in sheep pasture, and the remainder in arable cultivation, or occupied by woods, pleasure-grounds, towns, and villages. Politically speaking, this county comprehends twenty-nine entire parishes, and a portion of five others, which, united, contain, according to the parliamentary returns of 1811, 6518 houses, and 37,230 inhabitants.

Historical Events.—To narrate all the military transactions which history and tradition affirm to have occurred within this county, would be to occupy our pages with an almost endless detail of petty conflicts and depredatory excursions. Roxburghshire being a border district, and uniting, for above 60 miles, with England, was, for several centuries, a perpetual scene of border warfare; so that there is scarcely a spot throughout its whole extent, where some feat of valour, or deed of destruction, has not happened. Every parish presents, to the discerning eye of the antiquary, some relic of those wretched days when the restraints of law were set at defiance, and rapine and butchery constituted the chief delight both of the lord, and of his vassal peasantry. Of those events which do not bear the character of predatory warfare, the most prominent are the siege of Roxburgh castle, by king James II., before-mentioned, and the battle of Jedburgh, in which the Scots were completely defeated by the English under the earl of Surrey. The latter event happened in the year 1523.

General Aspect of the County.—The surface of Roxburghshire is finely diversified, and exhibits many scenes that are truly beautiful, but few that are romantic or sublime. It is commonly considered as divided into four natural districts; Hawick, Jedburgh, Kelso, and Melrose. Of these, the

district of Hawick is the most mountainous; and there is also a chain of hills along the southern boundary of the county. The other divisions present to the eye a succession of hills and vallies. The hills have mostly sloping sides, and are covered with a green sward to their very summits. Very few of them are bleak, and none of them rugged or tremendous. The prospects from their highest points are extensive, variegated, and delightful. The numerous vales, whether of narrow, or of wide extent, are all watered by limpid streams; many of them naked, and others fringed with wood. Some afford excellent pasture, and others are in high cultivation. They are in general inclosed by very gentle declivities, though several are hemmed in by steep banks, over-run with brush-wood, or adorned with lofty trees, which form a scenery rather agreeable than magnificent. In a county so extensive, and, on the whole, so much elevated, the proportion of heath and moss is very inconsiderable, but cannot be calculated with any degree of exactness, as they are scattered every where in portions of unequal size. In Liddefdale, where improvement has made the least progress, patches of moss are seen by the edges, and even in the middle of fertile vales. There are indications of this having been formerly the case in other parts of the county, on which industry has now wrought a happy change.

Mineralogy.—Roxburghshire derives little importance from its mineral products. Coal has been discovered in several places, but is wrought only in one spot, near the southern extremity of the district of Liddefdale. Hence the county labours under the serious disadvantage of a want of fuel, which must be brought from Northumberland, or Midlothian, by land-carriage. Throughout the whole shire lime-stone is abundant, but little of it is calcined for sale, except in the neighbourhood of the Liddefdale collieries. Free-stone also is plentiful. The principal stratum extends in a north-east direction from the farthest point of Liddefdale to the neighbourhood of Spronstoun, where it is of a fine, hard, and durable nature. Different kinds of whinstone appear every where on the surface, in the beds of brooks, and in inexhaustible quarries. Vast beds of shell marle lie scattered throughout the contiguous parishes of Robertson, Ashkirk, Wilton, Minto, Lilliesleaf, Bowden, Galashiels, and Selkirk. There are likewise large marle pits at Eckford and Ednam; and some less considerable ones in various places. Pebbles are found in vast multitudes in the vicinity of the Cheviot hills. In the parish of Hobkirk, there is a place called Robert's Linn, where there are large rocks of pebbles, which are manufactured into seals and buttons of various kinds. Most parts of these rocks are of a light blue colour; but some portions of them are finely varied with streaks of red and yellow; and so much are they esteemed, that great numbers of them are conveyed to Sheffield, Birmingham, and other towns.

Rivers, &c.—No county in Great Britain can boast of more numerous, or more beautiful rivers and brooks. One flows through, and enlivens every little vale. The principal of them are, the Teviot, the Jed, Tweed, Rule, Kale, Oxnam, Gala, Slittridge, Ale, Calla, Borthwick, Ednam, Bowmont, Allan, Leader, Ettrick, Hermitage, and Liddel. The two last are discharged into the Elk, which runs into the Solway frith; the others fall into the Tweed, which empties itself into the sea. This river holds a majestic course along banks which, in several places, are steep and bold, jutting out, at Old Melrose, into a promontory, and forming around Dryburgh abbey a peninsula. It partly bounds, and partly intersects, the county; receiving on the north the Gala, which is the boundary with Selkirkshire and Midlothian for five miles; the Leader, which, for nearly

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the same space, is the boundary with Berwickshire; the Allan, a pastoral rivulet; and the Eden, which takes its rise in Berwickshire, but runs a considerable way along the skirts, and through the lower district of this county. Ettrick, also a boundary of Selkirkshire for two miles, falls into the Tweed on the south. Teviot rises in the western part of the county, in a very elevated district, and descends at first from the mountains with a rapid course; but it afterwards flows with many delightful windings through a succession of rich, extensive, and well cultivated vallies, till it loses itself in the Tweed between Roxburgh castle and Kelfo, one of the most enchanting spots which can be well imagined. The Ale and Borthwick are the northern branches of Teviot. Both of them have their sources in Selkirkshire, and in some places bound that county and Roxburghshire. On the south the Teviot is augmented by the Oxnam, the Jed, and the Kale. The two last issue from the border hills. The Kale frequently overflows the greater part of an expanded and valuable plain, adorned by clumps of trees; while the Jed, rushing along a rocky channel, through narrow and thick wooded vales, washes the bottom of several high precipices, winds round the town of Jedburgh, and terminates another, and still more extensive plain, called Crailinghaugh, through the centre of which the Oxnam finds its way to Teviot. Nearer to its source, the last-mentioned river receives the Rule, the Slittridge, and the Allan, all of which rise on the confines of Liddesdale. In the number and value of its trees, Rule may vie with "Silvan Jed," though not in wild and picturesque scenery. Slittridge is not without the beauties of green hills, natural wood, and hollow vales. Southern Allan, like the stream of the same name north of Tweed, flows entirely through sheep-walks. Bowmont, also a pastoral river, has its source in the south-east district of the county, and after a rapid course of nine or ten miles, enters England. But of all the waters in Roxburghshire, none are more indebted to nature, or might be more improved by art, than Hermitage, which rises in the southern declivity of the same ridge, whence the Allan and the Slittridge issue in different directions, and tumbling over a bottom of rough, shapeless stones, amidst green hills, whose bases are generally skirted with copse-wood, loses itself in the Liddel, and imparts its natural ornament to that larger stream which is celebrated by Armstrong in the following strains:

"----- Such the stream
On whose Arcadian banks I first drew breath,
Liddel, till now, except in Doric lays,
Tun'd to her murmurs by her love-sick swains,
Unknown in song; tho' not a purer stream
Through meads more flowery, more romantic groves,
Rolls towards the western main. Hail sacred flood!
May still thy hospitable swains be blest
In rural innocence; thy mountains still
Teem with the fleecy race; thy tuneful woods
For ever flourish; and thy vales look gay
With painted meadows, and the golden grain."

There are no lakes of any great extent in this county, but there are several pre-eminent for the beauty of their scenery, and the abundant supply of fine perch and pike which they contain. Alcmuir-loch, which ranks first among the Roxburghshire lakes, is somewhat more than two miles in circumference. Trouts of various sizes and flavour abound in all the rivers, and the Tweed and Teviot, but particularly the former, are crowded with grilse and salmon.

Climate.—In a county of such extent as Roxburghshire,

the climate must of course be extremely various. In proportion to the elevation of the ground, the air is more moist and sharp. The warmest and driest months of the year are July and August, but prodigious thunder showers are very frequent. In September and October the weather admits of every possible variation. It is often serene and pleasant; but excessive rains, winds, and frosts, and even hail and snow, are by no means uncommon; and frequently do incredible damage to the crops. November is nearly of the same complexion; and what seems singular, in December the weather in general is moderate and uniform. Frost and snow are seldom severe or of long duration before Christmas. January and February are the months when snow is most common, and frost most intense. With some short interruptions they very frequently remain till dissipated by the sun in March. Cold easterly winds prevail much in April and May, and often even in June, either bringing constant rain for a succession of days, or exhaling moisture so rapidly from the earth, as to flint the tender stalks both of corn and grass. But these assertions, though generally true, are at times reversed. After an open and soft winter, great quantities of snow have fallen in March, April, and May. In other years April has been wonderfully mild, May and June the warmest, July and August the wettest, and September and October the most settled months.

Soil.—In the pasture district of Roxburghshire the soil is dry, wet, or heathy. To the eastward of Jed Water, the hills are chiefly composed of red granite, and covered with a rich sward of sweet grass: there is very little heath: the marshes are few and not extensive, and are intersected by numerous drains. To the west of Jed Water, including Liddesdale, the dry soil either rests upon lime-stone or gravel. In this district are many mosses and much fenny land; likewise a large tract of strong clayey soil, lying on a cold tilth, or hard clay, which is impervious to water. In the arable division of the county the soil is partly light and partly heavy. The light consists of a rich loam, or mixture of loam and sand, of loam and gravel, of sand, or gravel and clay, in every various proportion. The heavy soil is chiefly clay of different depths and degrees of stiffness or mixtures, where clay prevails placed on tilth, or other matter retentive of water. In very few spots this surface lies on a dry bottom; and not unfrequently different and opposite soils are strangely blended in the same field. The light soil, however, is in general formed on low and level lands, near the beds of rivers, and their branches, and also on several eminences of considerable extent, especially in the parishes of Linton, Crailing, Ancrum, Maxton, and Melrose. The heavy soil rarely appears in the vallies, and chiefly occupies the higher grounds. The largest tract of it lies immediately south of Eildon Hills, including nearly the whole parishes of Minto, Lilliesleaf, and Bowden, a portion of Melrose, St. Boswell, Ancrum, Maxton, and Roxburgh parishes. It comprehends in all about 10,000 acres, of which at least one half is shallow, cold, and unkindly, difficult to labour and uncertain in its produce; on which many acres of it have been planted with trees. In the other half there is much rich and fertile land, which bears luxuriant crops both of corn and grass, and not a little of a middle nature between these extremes. In the parishes also north of the Tweed, the heavy soil is rather most prevalent, and is, in general, of a good quality. Another considerable portion of it runs along the higher grounds south of the Tweed, in the parishes of Spronitoun, Kelfo, Roxburgh, and Exford, and there are detached fields of it in other parts of the district. In the bosom, or deeply in-

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dented into the fides of these clayey tracts, are pieces of dry land of an admirable quality for producing either white or green crops. Of the arable district at large, at least two-thirds may be designated light and dry.

Agriculture.—Farms in Roxburghshire are of every size, from 50 to 6000 acres; yielding from 50*l.* to nearly 3000*l.* annual rent. The arable farms include, in general, from 200 to 500 acres, but there are some far less and some much more extensive. One tenant frequently possesses two or three farms, and there are instances of the same persons leasing both an arable and a sheep farm, to obtain the double profit arising from rearing sheep to a larger size, by wintering them on after-grass and turnips, and fattening both them and their lambs earlier, and better, for the market. With the breeders of that valuable animal, turnips have been for many years a greater object than formerly, and hence some farmers have engaged more deeply in arable husbandry, instead of accumulating, as before, pasture farms. The character of farmers in this county, like the extent of the farms, admits of much variety: but it may be truly said, that the greater part of them are men of respectability and of agricultural enterprize. Rents are in every case paid in money. One or two clergymen, who have a right to tythes, have been accustomed from time immemorial to accept of a small sum in lieu of them. Leases differ in duration and conditions in the pasture and arable districts. In the former they extend only from seven to fifteen years; but in the latter they are given for nineteen or twenty-one years.

Considerable tracts of land here, particularly in the extensive district of Liddesdale, remain in a state of nature. The cold wet soil, already noticed, and the exposed situation, afford no encouragement for attempting agricultural improvements. This large tract is therefore wholly under sheep pasturage, except a few strips of land on the banks of the Hermitage and the Liddel. The most ancient agriculture in this county would appear to have been very different from the present. The marks of the plough, and of regular ridges, are still every where to be seen upon lofty mountains, where no grain can now be produced, and upon a soil which has ceased to be regarded as entitled to the appellation of arable land. These facts prove that the surface of the country must have formerly been in a very different state from that in which it now appears. The modern improvements in agriculture are all adopted here by the arable farmers. The first person who set the example of spirited exertion was William Dawson, esq. a farmer's son, who, after receiving a liberal education, was sent by his friends into England, for the purpose of obtaining a knowledge of the practical agriculture of that part of the united kingdom. He returned to his native country in 1753, and immediately introduced the practice of the turnip husbandry. At first his improvements were considered as rash and speculative, but his success soon effected a change of opinion. Mr. Dawson's neighbour perceiving the advantages of the new plan, became eager to understand and adopt it. The hinds which had once been in his service, were sure to find employment; his ploughmen were in the utmost request; they were transported to East Lothian and even to Angus, and every where diffused the improved practice of that valuable art. Roxburghshire became the scene of the most active agricultural enterprizes; and Mr. Dawson, independently of having acquired a large property, had the satisfaction to live to see himself regarded, and hear himself called, the father of agriculture in the south of Scotland.

The rotation of crops used in this county have nothing peculiar, or particularly requiring notice. On a dry soil, it is considered an object of importance to throw a large quan-

tity of land under turnip or grass, especially after lime. One part of Roxburghshire has long been celebrated for an early species of oats, denominated Blainsly oats, from the circumstance of their having been cultivated for time immemorial at Blainsly, a large district in the parish of Melrose, near the northern extremity of the county: the average produce there is six to one, but when they are grown on a rich dry soil, it is sometimes 16 or 18 to one. They are sold at an average of 3*s.* 6*d.* per boll dearer than common oats, and are only objectionable in one point of view, *viz.* that they are apt to shake out. Abundant crops of wheat are reared in the lower and more fertile districts of the county. Bear is likewise raised in considerable quantities; but the culture of peas and beans has become very limited, since the practice of turnip feeding has been so generally introduced. Of potatoes, comparatively few are cultivated; neither are great crops of hay frequent in this county, on account of the want of towns in which they might find a ready sale. Little flax is grown, except as an object of domestic manufacture. It is a remarkable fact, and a subject of curiosity in agricultural history, that this county was at one time likely to have become noted for the cultivation of tobacco. It was introduced by Mr. Thomas Mann, and was tried both at Newstead and at Kelso with such success, that the legislature deemed it requisite to interfere, and put an end to its culture.

Live Stock.—Very considerable numbers of cattle are fed in Roxburghshire, but sheep is the staple animal of the county. The latter are estimated at nearly 300,000 in number, and are mostly of the Cheviot breed. A large quantity of ewe-milk cheese, of the best quality, has long been an object of manufacture here, but the practice is now on the decline. The horses employed and bred here are either of the English or of the Lanarkshire breed. Swine are reared by almost every cottager and farm-servant who is married; also vast quantities of poultry. Several cart-loads of the eggs of dunghill fowls are weekly collected by "egglers," who sell them in Berwick for the London market.

Incllosures.—A very small proportion of the lands in this county are inclosed. The fence chiefly used is ditch and hedge, of which there are two kinds, namely, the double and the single. The double consists of two ditches, having a hedge planted in the embankment between them. Where stones can be easily procured, stone-dike inclosures are preferred to the hedge and ditch. One of the most substantial fences of this kind in the county incloses about 600 acres, called the "Deer park of Holydean," on the Roxburgh estate. It is traditionally stated to have been constructed before the year 1500. It is about four feet high, and though built of whinstone only, without lime or mortar, continues to be a good fence. In a few places dikes are formed of alternate layers of stone and turf.

Towns, Villages, and Fairs.—There is only one royal borough in this county, that of Jedburgh, which, along with the boroughs of Haddington, Lauder, Dunbar, and North Berwick, elects a member to serve in parliament. This place is the county town, and makes a considerable figure in the history of the border wars. (See JEDBURGH.) The other principal towns and villages are, Hawick, which is situated at the confluence of the Teviot and Slittridge, near the lower part of the upper, or most mountainous district of the county; Kelso, which stands on the northern bank of the Tweed; and Melrose, celebrated for its abbey, each of which the reader will find described under their respective names.

The greatest fair in the county is held in the parish of

Leffudden, or St. Boswell, whence it is called St. Boswell's fair. It takes place on the 18th of July, and is the principal mart for sheep and lambs in the south of Scotland; but horses, linen, and woollen cloths, are likewise sold in considerable quantities. The customs of this fair belong to the duke of Buccleugh, and may be estimated at about 50*l.* per annum. Another great fair is held in the vicinity of Kelfo. It is called St. James's fair, from the circumstance of its being holden within the ancient parish of that name, which is now merged in the parish of Kelfo.

Antiquities.—The vestiges of ancient times still visible in Roxburghshire are numerous. Mutilated encampments, and ruined buildings of strength, are discovered in a great variety of situations, and particularly in the high district of the county. In the parishes of Cavers, Hawick, and others, remnants may be traced of what is called the Cat-rail, which is conjectured to have been a boundary rampart, similar to the Wansdike and Offa's dike in England; but whether erected by the Romans, Saxons, or Britons is uncertain; though Whitaker, in his History of Manchester, contends strongly that it is of British origin. In the parish of Robertson, near the source of the Teviot, is a large square encampment, which is still denominated *Africa*, and in the vicinity are several smaller semi-circular intrenchments. There are likewise encampments on the Eildon hills, on Carberry hill, Sidehill, at Ancrum, and on the farm of Flight, in the parish of Clintwood. In the same parish are likewise numerous fortifications, called Picts' works, which are of a circular form, and constructed of large stones. On the farm of Millburn is a small circle of nine upright stones, surrounded by a ditch, which is supposed to have been a Druidical temple. Cairns appear in different parts of the county. Of these, the most remarkable is at Whiffgills. The quantity of stones is immense, and they are mostly of a very large size. Near it is a large upright stone, called the "standing stone." This cairn is situated in the centre of an extensive and deep moss, where not a stone is to be discovered except those employed in its construction. Another immense cairn is placed on an eminence between the parishes of Castleton and Canonby. It is eighty-six yards long, and consists of masses of free-stone, of great magnitude. A standing stone, thirteen feet in circumference, and seven feet above ground, is fixed at the north end of it; and there are five other smaller ones, forming, with the larger stone, a circle round the cairn forty-five yards in diameter. How these enormous masses were originally collected, or for what purpose, it is very difficult to determine. At Milnholm, in the parish of Canonby, stands an ancient cross, formed of one stone, eight feet four inches high, on which are sculptured a sword and some ancient writing; but the latter is so much mutilated, that it cannot be read. On the banks of the Ale Water, near Ancrum, is a series of caves, some of which still preserve vestiges of fire-places, and holes for the passage of smoke. Similar caves are discovered on the banks of the Jed.

Roxburghshire formerly abounded with towers, or petty fortresses, erected by the border chieftains, for the defence of the country from the incursions of the English borderers. Few of these, however, now remain; indeed the only ones entire are Delphinstone tower, and another at Mofsburnford. Of the larger castles, the principal are Clintwood castle, Goldieland castle, Gofsford castle, and Roxburgh castle, the last of which is mentioned under ROXBURGH. In this county are situated the ruins of three monasteries, among the most important in Scotland, *viz.* Melrose, Kelfo, and Jedburgh abbies. See MELROSE, KELSO, and JEDBURGH.

Eminent Natives.—Roxburghshire boasts to have been the

birth-place of several characters distinguished in the annals of literature and military glory. Of these, the most noted were Thomson, author of the Seasons; Armstrong, author of the "Œconomy of Love," and various miscellaneous poems; Gavin Douglas, who translated several of the works of the Latin poets into Scottish verse; and general Elliot, afterwards lord Heathfield, the gallant defender of Gibraltar, when it was attacked in 1786, by the combined powers of France and Spain. Beauties of Scotland, vol. ii. 1805. Agricultural Survey of the Counties of Roxburgh and Selkirk, by Robert Douglas, D.D., 8vo. 1800.

ROXBURY, a pleasant town of America, in Norfolk county, Massachusetts; 1 mile S.W. of Boston. It is now divided into three parishes, and was settled in 1630. The three parishes contain 3669 inhabitants. The first of these parishes has been lately connected with Boston harbour by a canal. The famous John Eliot, called the apostle of the Indians, was the first minister who settled in this place. He translated the Bible, and other pious books, into the Indian language; and founded many religious societies among the Indians. Some few remain to this day. He died in 1670, after being pastor 60 years.—Also, a township in the W. part of Orange county, Vermont, containing 361 inhabitants.—Also, a township of Morris county, New Jersey, on Musconegunk river, 25 miles from its confluence with the Delaware, and 45 miles N. of Trenton; containing 1563 inhabitants. Near it is a mineral spring.—Also, a town in Litchfield county, Connecticut, containing 1217 inhabitants.—Also, a township of Washington county, in the state of Ohio, containing 408 inhabitants.

ROXCESTER. See WROXETER.

ROXEN, a lake of Sweden, in East Gothland; 100 miles W.S.W. of Stockholm.

ROXO, CAPE, a cape on the S.W. coast of Porto Rico. N. lat. 18° 1'. W. long. 65° 50'.—Also, a cape of Spain, on the coast of Valencia. N. lat. 37° 53'. W. long. 0° 50'.—Also, the S.E. point of a small island in the gulf of Mexico, situated before the mouth of the river Panuco. N. at. 22° 30'. W. long. 100° 11'.—Also, a cape on the W. coast of Africa. N. lat. 12° 15'. W. long. 16° 35'.

ROY, LOUIS LE, in *Biography*, a learned professor, born at Constance, in Normandy, about the beginning of the 16th century. After having studied in Italy and other places, he settled at Paris, where, in 1570, he was appointed to the professorship of Greek. After this he studied the law four years at Toulouse; he frequented the bar at the parliament of Paris, in which he exercised some kind of magistracy. He sometimes followed the armies; and had visited the courts of the emperor, and king of England. His inattention to domestic affairs reduced him at last to depend upon the liberality of others for his daily subsistence. He died at an advanced age in the year 1571, leaving behind him, as monuments of his learning, many works in the Latin and French languages. In the former he gained considerable reputation, by an elegantly written life of the learned Budæus. He gave good translations into the French of the works, or part of them, of Plato, Aristotle, and Demosthenes, which he enriched with learned commentaries.

ROY, JULIEN-DAVID LE, an architect and antiquary, born at Paris in 1728, was the son of Julien le Roy, a celebrated mechanist, who excelled particularly in the art of watch-making, so much so, that his time-pieces acquired the same celebrity in France as those of Graham in England; he died at Paris in 1759, at the age of 74, leaving four sons; of whom Julien, the subject of this article, was educated for the profession of an architect, in which he became eminent. He is well known in the literary world by the following works;

works; "Ruines des plus beaux Monumens de la Grèce;" this obtained for the author admission into the Academy of Inscriptions; "Histoire de la Disposition et des Formes differentes des Temples des Chretiens;" "Observations sur les Edifices des anciens Peuples;" "De la Marine des anciens Peuples." He published two other works on the construction of the ships of the ancients; and a memoir on cutting masts in the Pyrenées. This ingenious man died at Paris in the year 1803, at the age of 75.

ROY, PETER, brother of the above, was watch-maker to the king, and published memoirs for the clock-makers of Paris,—Etrennes Chronometriques—Treatise on the Labours of Harrison and le Roy for the Discovery of Longitude at Sea. He died in 1785. It is well known, says a contemporary biographer, that the English, on account of their numerous discoveries in this art, had enjoyed such a reputation for the excellence of their clocks and watches, that they found every where a market, in preference to any others, and that the French themselves were obliged to come to England for their time-pieces. Julien le Roy, the father, had the honour of removing, in part, this pre-eminence, and of transferring it to the French. He made many discoveries in the construction of repeating-clocks and watches: in second and horizontal watches he invented an universal compass with a sight;—an extremely useful and simple contrivance for drawing a meridional line, and finding the declination of the needle; and also a new universal horizontal dial. It is to him we are indebted for the method of compensating for the effects of heat and cold in the balances of chronometers, by the unequal expansion of different metals, a discovery which has been brought by our English artists to a state of great perfection, although it had been thrown aside by the inventor's son, Peter.

ROY, in *Geography*, a town of Silesia, giving name to a lordship in the principality of Teschen; 6 miles N. of Teschen.

ROYA, EL, a town of Spain, in Old Castile; 10 miles N.N.W. of Soria.

ROYAL, *regal*, something relating to a king.

The word is French, formed from the Latin *regalis*, of *rex*, king.

In this sense we say, the royal family, the royal blood, royal line, &c.

In England, the prince and princess of Wales, the king's brothers, &c. are addressed under the title of *royal highness*.

ROYAL Abbey, denotes an abbey founded by a king, or by a prince who is succeeded by a king.

ROYAL Academy of Arts. See LONDON.

ROYAL Academy of Sciences, &c. See ACADEMY.

ROYAL Academy of Music. See OPERA.

ROYAL Antler, among Hunters, expresses the third branch of the horn of a hart or buck, that shoots out from the rear or main horn above the back-antler.

ROYAL Army. See ARMY.

ROYAL Assent, is that assent or approbation which the king gives to a thing done by others; as the election of a bishop by dean and chapter, or to a bill passed in both houses of parliament.

The royal assent in parliament being given, the bill is indorsed with these words, *Le roy le veut*; that is, *it pleases the king*. If he refuses it, thus, *Le roy s'avisera*, q. d. *the king will advise upon it*. See PARLIAMENT.

ROYAL Boroughs. See BOROUGH.

ROYAL Crown, is that worn by kings. See CROWN.

ROYAL Charter. See CHARTER.

ROYAL African Company. See COMPANY.

ROYAL Exchange, the bourse or meeting-place of the merchants in London.

It was first built in 1566, at the charge of sir Thomas Gresham; and in a solemn manner, by herald with sound of trumpet, in presence of queen Elizabeth, proclaimed the Royal Exchange. Till that time the merchants met in Lombard-street.

It was built of brick, yet then esteemed the most splendid bourse in Europe. A hundred years after its building, at the great fire, it was burnt down; but it was soon raised again in a still more magnificent manner, the expence of it amounting to 50,000*l*.

One half of this sum was disbursed by the chamber of London, the other by the company of mercers; who, to reimburse themselves, let to hire a hundred and ninety shops above stairs, at twenty pounds each; which, with other shops, &c. on the ground, yielded a yearly rent of above four thousand pounds; yet the ground it stands on does not exceed three-fourths of an acre; whence it is observed to be much the richest spot of ground in the world.

It is a quadrangular building, with walks around, in which the merchants of the respective countries associate themselves. In the middle of the area, or court, is a fine marble statue of king Charles II., in the habit of a Roman Cæsar, erected by the society of merchant-adventurers; the workmanship of Grinlin Gibbons. Around are ranged the statues of the several kings since the Norman Conquest. See LONDON.

ROYAL Fishes are whales and sturgeon, and some add porpoises too; which the king, by his prerogative, is to have, whenever cast on shore, or wrecked, in all places of the realm; unless granted to subjects by express words.

ROYAL Foot, Fort, Franchise, Hospital. See the substantives.

ROYAL Oak, was a fair-spreading tree at Boscobel, in the parish of Donnington, in Staffordshire, the boughs of which were all covered with ivy; in the thick of which king Charles II. sat in the day-time with colonel Careless, and in the night lodged in Boscobel-house; so that they are mistaken who speak of it as an old hollow oak; it being then a gay flourishing tree, surrounded with many more. The poor remains of it are now fenced in with a handsome wall, with this inscription over the gate, in golden letters: FELICISSIMAM ARBOREM, QUAM IN ASYLUM POTENTISSIMI REGIS CAROLI II. DEUS OP. MAX. PER QUEM REGES REGNANT, HIC CRESCERE VOLUIT, &c. Phil. Trans. N^o 310.

ROYAL Oak, *Robur Carolinum*, in *Astronomy*, one of the new southern constellations, the stars of which, according to Sharp's Catalogue, annexed to the Britannic, are 12. See CONSTELLATION.

ROYAL Officers. See OFFICER.

ROYAL Parapet, or Parapet of the Rampart, in *Fortification*, is a bank about three fathoms broad, and six feet high, placed upon the brink of the rampart, towards the country; to cover those who defend the rampart.

ROYAL Poop. See POOP.

ROYAL Port. See PORT Royal.

ROYAL Society of England, is an academy, or body, of persons of eminent learning; instituted by king Charles II. for the promoting of natural knowledge.

This illustrious body had its original in an assembly of ingenious men, residing in London, who, being inquisitive into natural, and the new and experimental philosophy, agreed, about the year 1645, to meet weekly on a certain day, to discourse upon such subjects. These meetings, it is said, were suggested by Mr. Theodore Haak, a native of the Palatinate in Germany; and they were held sometimes at Dr. Goddard's lodgings in Wood-street, sometimes at a convenient place in Cheap-side, and sometimes in or near

Gresham College. This assembly seems to be that mentioned under the title of the "Invisible, or Philosophical College," by Mr. Boyle, in some letters written in 1646 and 1647. About the years 1648 and 1649, the company, which formed these meetings, began to be divided: those in London continued to meet there as before; and those who were removed to Oxford occasionally joined them. The latter, *viz.* Dr. Wilkins, Dr. Wallis, and Dr. Goddard, in connection with others, continuing their assemblies in Oxford, brought the study of natural and experimental philosophy into fashion there; meeting first in Dr. Petty's lodgings, afterwards at Dr. Wilkins's apartments in Wadham College, and, upon his removal, in the lodgings of the honourable Mr. Boyle. The greatest part of the Oxford society coming to London about the year 1659, they met once or twice a week in term-time, at Gresham College, till they were dispersed by the public distractions of that year, and the place of their meeting was made a quarter for soldiers. Upon the Restoration, in 1660, their meetings were revived, and attended with a larger concourse of persons, eminent for their character and learning.

They were at length taken notice of by the king, who was pleased to grant them an ample charter, dated the 22d of April 1663, by which they were erected into a corporation, "consisting of a president, council, and fellows, for promoting natural knowledge."

Their manner of electing fellows is by balloting. Their council are in number twenty-one, including the president, vice-president, treasurer, two secretaries, and secretary for foreign correspondence; eleven of which are continued for the next year, and ten more added to them; all chosen on St. Andrew's day. Each member, at his admission, subscribes an engagement, that he will endeavour to promote the good of the society; from which he may be freed at any time, by signifying to the president, that he desires to withdraw.

The charges are five guineas paid to the treasurer at admission; and thirteen shillings *per* quarter, so long as the person continues a member; or, in lieu of the annual subscription, a composition of twenty-six guineas in one payment.

Their design is, to "make faithful records of all the works of nature or art, which come within their reach; so that the present, as well as after-ages, may be enabled to put a mark on errors which have been strengthened by long prescription; to restore truths that have been neglected; to push those already known to more various uses; to make the way more passable to what remains unrevealed," &c.

To this purpose they have made a great number of experiments and observations on most of the works of nature; eclipses, comets, meteors, mines, plants, earthquakes, inundations, springs, damps, subterraneous fires, tides, currents, the magnet, &c. Also numbers of short histories of nature; arts, manufactures, useful engines, contrivances, &c. The services they have been of to the public are very great. They have improved naval, civil, and military architecture; advanced the security and perfection of navigation; improved agriculture; and put not only this kingdom, but also Ireland, the plantations, &c. upon planting.

They have registered experiments, histories, relations, observations, &c. and reduced them into one common stock; and have, from time to time, published some of the most immediate use, under the title of Philosophical Transactions, &c. and laid the rest up in public registers, to be nakedly transmitted to posterity, as a solid ground-work for future systems. See TRANSACTIONS.

They have a library adapted to their institution; towards which Mr. Henry Howard, afterwards duke of Norfolk, contributed the Norfolkian library, and which is, at this time, greatly increased by a continual series of benefactions. The museum, or repository, of natural and artificial rarities, given them by Daniel Colwal, esq., and since enriched by many others, is now removed to the British Museum, and makes a part of that great repository. Their motto is, NULLIUS IN VERBA; and their place of assembling is Somerset-place, in the Strand. Sir Godfrey Copley, bart., left five guineas to be given annually to the person who should write the best paper in the year, under the head of experimental philosophy. This reward, which is now changed to a gold medal, is the highest honour the society can bestow. It is conferred on St. Andrew's day.

ROYAL Society of Musicians. See MUSICAL FUND, and Royal Society of Musicians.

ROYAL Spanish Academy. See ACADEMY.

ROYAL Sugar. See SUGAR.

ROYAL, in *Sea Language*, is a name given to the highest sail which is extended in any ship. It is spread immediately above the top-gallant sail, to whose yard-arms the lower corners of it are attached. The sail is never used but in light and favourable breezes.

ROYAL Stay. See STAY.

ROYAL Yard. See YARD.

ROYALS, in *Artillery*, are a kind of small mortars, which carry a shell, whose diameter is five inches and a half. See MORTAR.

ROYAL Bay, in *Geography*, a bay on the N.E. of the island of Georgia, between Cape George and Cape Charlotte.—Also, a bay on the N. coast of Antigua, a little to the E. of Peyerfan's Point.

ROYAL, or *Minong, Island*, an island about 35 miles long, and 12 wide, in the N.W. part of lake Superior. N. lat. 47° 52'. W. long. 89°.—Also, a small fertile island in the river St. Lawrence, 60 miles below lake Ontario. N. lat. 44° 46'. W. long. 75° 24'.

ROYAL Reach, a channel in the straits of Magellan, extending from Fortescue bay to Passage Point.

ROYAL Sound, a large bay on the coast of Kerguelen's land, between Cape George and the Prince of Wales's Foreland.

ROYAL'S River, a river of America, in Cumberland county, Maine, which runs into Casco bay, in the township of North Yarmouth.

ROYALSTON, a township of Worcester county, Massachusetts; 40 miles N.W. by N. of Worcester; incorporated in 1665, and containing 1415 inhabitants. Miller's river traverses this town from the east.

ROYALTIES, REGALITIES, the rights of the king; otherwise called the *king's prerogative*, and the *regalia*. See PREROGATIVE and REGALIA.

Of these, some the king may grant to common persons; others are inseparable from the crown.

ROYALTON, in *Geography*, a township of Windsor county, in the state of Vermont, N.W. of Hartford, on White river, containing 1748 inhabitants.

ROYAMUNGAL, a river of Bengal, which runs into the bay of Bengal, N. lat. 21° 35'. E. long. 89° 18'.

ROYAN, a town of France, in the department of the Lower Charente, on the Garonne; fortified by the Huguenots, and defended so vigorously against Louis XIII. in the year 1621, that he was compelled to withdraw his troops; but he afterwards avenged his disgrace, by demolishing it so entirely, that the present place is only the suburbs of the former; 12 miles S. of Marenes.

ROYAUMEIZ,

ROYAUMEIX, a town of France, in the department of the Meurte; 6 miles N. of Toul.

ROYBON, a town of France, in the department of the Ifere, and chief place of a canton, in the district of St. Marcellin; 7 miles N.N.W. of St. Marcellin. The place contains 2412, and the canton 7373 inhabitants, on a territory of 190 kilometres, in 11 communes.

ROYE, a town of France, in the department of the Somme, and chief place of a canton, in the district of Montdidier; 15 miles S.S.W. of Peronne. The place contains 3176, and the canton 14,027 inhabitants, on a territory of 195 kilometres, in 39 communes. N. lat. 50° 8'. E. long. 2° 52'.

ROYENA, in *Botany*, named by Linnæus in honour of Adrian Van Royen, professor of Botany in the university of Leyden, who died in 1779, aged 74, and was succeeded by his nephew David, who died in 1799.—Linn. Gen. 221. Schreb. 299. Willd. Sp. Pl. v. 2. 631. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 61. Thunb. Prodr. 80. Jull. Gen. 156. Lamarek Dict. v. 6. 320. Illustr. t. 370. Gært. t. 94.—Class and order, *Decandria Digynia*. Nat. Ord. *Bicornes*, Linn. *Guaiaacæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, urn-shaped, five-cleft, permanent. *Cor.* of one petal; tube the length of the calyx; limb spreading, revolute, deeply cloven into five, ovate segments. *Stam.* Filaments ten, very short, springing from the corolla; anthers oblong, acute, twin, erect, as long as the tube. *Pist.* Germen superior, ovate, terminating in two styles, a little longer than the stamens; stigmas simple. *Peric.* Berry invested with the coriaceous calyx, fleshy, of four cells, two of them often abortive. *Seed.* Nuts solitary, ovate, somewhat triangular.

Eff. Ch. Calyx urn-shaped. Corolla of one petal, with a revolute limb. Berry of four cells, two of them mostly abortive.

1. *R. lucida*. Shining-leaved African Bladder-nut. Linn. Sp. Pl. 568. (*Staphylo-dendron africanum sempervirens, foliis splendensibus*; Commel. Hort. v. 1. 187. t. 96.)—Leaves ovate, roughish with hairs.—Native of the Cape of Good Hope, as indeed are all the remaining species. It flowers in May and June.—The stem of this evergreen shrub is eight or ten feet high, branched in all directions. Leaves generally alternate, on short stalks, ovate, pointed. Flowers axillary, along the branches, very inconspicuous. Berry red, and fleshy like an apple.

2. *R. villosa*. Heart-leaved Royena. Willd. n. 2.—Leaves heart-shaped, oblong, downy beneath.—It flowers in June and July.—Very similar to the last in habit, but its branches are more villous. Leaves elliptic or oblong; heart-shaped at the base; on short, hairy stalks. Flowers axillary, nodding, solitary, on villous stalks. Bractæes two, opposite, ovate, pointed, downy, large, deciduous.

3. *R. pallens*. Pale Royena. Willd. n. 3.—“Leaves longish-obovate, obtuse, smooth.”—It flowers in June and July.—We know not of any description or figure of this species which stands on the authority of Thunberg, Aiton, and Willdenow, who merely give its specific character.

4. *R. glabra*. Myrtle-leaved African Bladder-nut. Linn. Sp. Pl. 568. (*Vitis idæa æthiopica, buxi minoris folio, floribus albis*; Commel. Hort. v. 1. 125. t. 65.)—Leaves lanceolate, smooth.—Flowers in September.—Stem shrubby, five or six feet high, sending out numerous slender, leafy, evergreen branches, covered with a purplish bark. Leaves rather small, ovate, pointed, entire, bright green. Flowers axillary, along the branches, white. Berry roundish, purple, ripening in our greenhouses in the winter.

5. *R. hirsuta*. Hairy-leaved African Bladder-nut. Linn.

Sp. Pl. 568. “Jacq. Collect. suppl. 110. t. 13. f. 1. fragm. t. 1. f. 2.”—Leaves oblong-lanceolate, rather villous.—Flowers in July.—Stem strong and woody, seven or eight feet high, alternately branched, with a grey bark. Leaves an inch long, covered with soft hairs. Flowers on short stalks, axillary, small, of a faded purple colour.

6. *R. polyandra*. Oval-leaved Royena. Linn. Suppl. 240. Willd. n. 6.—Leaves elliptical. Flowers polyandrous, polygamous.—Time of flowering unknown.—The stem has knotty, irregular branches. Leaves somewhat obovate, coriaceous, finely downy on both sides. Flowers in short, axillary, downy clusters.

7. *R. angustifolia*. Willow-leaved Royena. Willd. n. 7.—Leaves lanceolate, acute, somewhat hairy beneath. It flowers in June and July.—This species is adopted on the authority of Willdenow, who observes, that it differs from all the foregoing ones, in having narrow, lanceolate leaves, sharp at both ends, and somewhat hairy underneath.

ROYENA is very nearly allied to *Diospyros*; the chief points of difference consisting in the latter genus having from six to twelve cells in the fruit, and sometimes five or six divisions in the calyx. Linnæus's description of the fruit of *Royena* is erroneous. See *Diospyros*.

ROYENA, in *Gardening*, contains plants of the shrubby evergreen exotic kind for the greenhouse, of which the species cultivated are; the shining-leaved royena, or African bladder-nut (*R. lucida*); the heart-leaved royena, or African bladder-nut (*R. villosa*); the myrtle-leaved royena, or African bladder-nut (*R. glabra*); the hairy-leaved royena, or African bladder-nut (*R. hirsuta*).

Method of Culture.—These plants are often rather troublesome in raising, but their culture may be attempted by cuttings and layers. The cuttings should be made from the young shoots, and be planted in the early spring in small pots filled with a loamy earth, plunging them in a very moderate hot-bed, covering them carefully with hand-glasses, refreshing them often with water in small proportions. When they have stricken roots, and are begun to shoot, inure them gradually to the open air, and when they are well rooted remove them into separate small pots, managing them afterwards as other rather tender greenhouse plants, such as the orange-tree, &c.

And the layers may be made from the young bottom shoots, laying them carefully down by slitting them as for carnations, watering them often in the warm season, but very moderately in the cold. When they are become well rooted, take them off and plant them in separate pots in the same manner as the cuttings, giving them the same sort of management afterwards.

The last sort often sends up suckers from the roots, and may sometimes be increased by planting in the same way as the cuttings. They afford variety among other greenhouse plants.

ROYERRE, in *Geography*, a town of France, in the department of the Creuse, and chief place of a canton, in the district of Bourgaenuef; 9 miles S.E. of Bourgaenuef. The place contains 1476, and the canton 6675 inhabitants, on a territory of 290 kilometres, in 11 communes.

ROYMATLA, a river of Hindoostan, which is one of the mouths of the Ganges.

ROYMUNGUL, one of the mouths of the Ganges.

ROYOC, in *Botany*. See *ROIOC*.

ROYON, in *Geography*, a town of France, in the department of the traits of Calais; 10 miles N.W. of St. Pol.

ROYPOUR, a town of Hindoostan, in Oude; 25 miles N.W. of Manickpour.—Also, a town of Bengal; 30 miles

miles N.N.W. of Midnapour.—Also, a town of Hindoostan, in the circar of Boggilcund; 20 miles E. of Rewah.

ROYSTON, a town situated partly in Cambridgeshire, and partly within that of Hertford, is seated at the bottom of a hill, among the chalk downs. The name appears to have been derived from a cross, erected in the beginning of the twelfth century by a lady Roife, or Roisia, and thence called "Roife's Cross;" near to which a monastery for Aultin canons was afterwards built: the canons being competently endowed, houses and inns were erected, and in time formed a town, called Roife's Town, which was afterwards contracted to Roylton. At the time of the Domesday Survey, the town was situated in five parishes, and so continued till the 32d year of king Henry VIII., when it was constituted a distinct parish: and the church of the dissolved priory being made parochial, was, agreeably to the letter of the statute, denominated "The Parish Church of St. John Baptist in Roylton." The estates granted to the priory by the founders appear to have included nearly all the land on which the town now stands. In the first year of Richard I. the canons obtained the liberty of holding a weekly market, and also an annual fair during the whole of Whitsun week. Henry III. invested them with many additional privileges: and under these grants the trade and population of the town rapidly increased. The greater part of the houses were destroyed by fire in the reign of Henry IV.; but the convenient situation of the place as a corn-market contributed to its speedy restoration: and in the time of Henry VI., according to Hollinshed, wheat was so plentiful here as to be sold for twelve-pence the quarter. Camden mentions this town as being famous for the great export of maltsters and other dealers in grain; and for the incredible quantity of corn to be seen every market day on the adjacent roads. It is still celebrated for its corn trade, notwithstanding the great alteration which has taken place in the modes of traffic. The site of the priory with its appurtenances and liberties, and three annual fairs, were granted by Henry VIII., in consideration of 1761*l.* 5*s.* 0*d.* to Robert Chester, esq. whose posterity continued to possess the same for several generations: but these are now the property of the honourable Thomas Brand. Only a few remains of the priory buildings are now left, excepting the church, which consists of a nave, chancel, and aisles, with a low tower. Besides the priory, there were two other religious foundations in this town. One of them, a hospital dedicated to St. Nicholas, was founded so early as king John's reign; but no particulars of it are now known. The other, which was also an hospital or free chapel, was dedicated to St. John and St. James, and was in existence in the twelfth year of Henry III., as Walter de Gray, archbishop of York, then granted indulgences to such as should contribute to the support of its sick and weak brethren. Some remains of this hospital are yet extant in a dwelling-house. King James I. built a mansion here, as an occasional residence for enjoying the amusements of hawking and hunting. At the commencement of the civil wars Charles I. removed from Hampton-Court to this house. It is still called the king's house, but is fallen to decay. Beneath the market-place is a *Cave*, or subterraneous crypt or oratory, which has been dug out of the solid chalk, and had originally a perpendicular aperture rising to the street, and communicating with the upper part of the cavity. This was of a circular form, about two feet in diameter, and had been closed by a mill-stone, which was accidentally discovered in August 1742. This aperture, or descent, had holes for the feet cut into the chalk on each side; but as the lower part of

the crypt was found to be filled with loose earth and rubbish, this passage was quickly enlarged, the curiosity of the town's-people being strongly excited by the hope of discovering some concealed treasure. About two hundred loads of earth were drawn out; but the zeal of the labourers was only repaid by finding a skull, and other human bones, greatly decayed. The interior of this singular subterraneous apartment is completely circular, finished in a kind of dome above, broken only by the original entrance. Round the lower part of the sides is a series of rude carving of the crucifixion, several saints, and various other subjects from sacred and profane history. The bottom of this cell is surrounded by a raised seat about one foot high, and between two and three wide, but divided on the east side by a hollow place, called the Grave. The present entrance is by a regular descent or passage, nearly one hundred yards in length, formed in the chalk from an adjacent house. The diameter of the crypt is about twenty-five feet; and the height is between thirty and forty. The Roman road, called Ichfield Way, passed by this town. According to the population returns of the year 1811, the number of houses in this parish was 284, containing 1309 inhabitants. The market is held on Thursdays; and here are five annual fairs. Roylton is situated 20 miles N.E. from Hertford, and 37 miles N. from London. Beauties of England and Wales, vol. vii. by E. W. Brayley and J. Britton. Lyfons's Magna Britannia, Cambridgeshire. Stukeley's Palæographia Britannica.

ROYTON, a chapelry or township in the parish of Prestwich-cum-Oldham, and county of Lancaster, England, is two miles N. of the town of Oldham. This place abounds with cotton manufactories, which appear to have been settled here in consequence of the abundance of coal obtained. According to the population report of 1811, this township contained 625 houses, and 3910 inhabitants. Royton-hall is the seat of Joseph Pickford, esq. but formerly belonged to the Byron family, who possessed considerable landed property in the neighbourhood. The house is seated in a deep valley, surrounded by high hills. Beauties of England, &c. vol. ix. by J. Britton.

ROZANNA, a town of Lithuania, in the palatinate of Novogrodek; 48 miles S.W. of Novogrodek.

ROZANS, a town of France, in the department of the Higher Alps, and chief place of a canton, in the district of Gap; 10 miles W. of Serres. The place contains 900, and the canton 5024 inhabitants, on a territory of 195 kilometres, in 11 communes.

ROZAS, LAS, a town of Spain, in New Castile; 10 miles N.W. of Madrid.

ROZE, NICOLAS, in *Biography*, music-master of the church of the Holy Innocents at Paris, was born at Bourgneuf, in the diocese of Chalons-sur-Saône, in 1745. At seven years old he was received as a chorister in the collegiate church of Beaune, in Burgundy. Soon after, he had instructions from the abbé Rousseau of Dijon, music-master of Tournay. He had the misfortune to lose this amiable master in two years time, who had taught him to sing several motets or anthems in that short period. He was afterwards a considerable time totally without instructions. And what was still worse, he was under the authority of persons who prevented him from attempting composition.

The abbé Hornet, nephew to the maitre de chapelle of Notre-Dame, gave him lessons in singing, but he was absolutely forbidden composition by this master, for fear his application should injure the fine voice which nature had given him. At twelve years old he again found himself without an instructor, and going to the college of Beaune

to finish his classical studies, and afterwards to the seminary of Autun, where, during two years' residence, he composed the chief part of the chants which at present are adopted almost throughout the diocese.

At twenty-two years old he went into orders at Beaune. In 1669, as soon as he was admitted into priest's orders, he composed a mass, which he carried to Paris and presented to M. d'Auvergne, master of the king's band. This able professor encouraged him to pursue composition, and made him compose under his own eye a motet for the Concert Spirituel.

It was at this period that the abbé Roze began to make himself known; and this motet procured him the place of maitre de chapelle of the cathedral of Angers, which he retained five years.

In 1775 he was appointed to the Holy Innocents, and from that time he has continued to furnish the Concert Spirituel with motets; and though his style is modern, he has never deviated from the grandeur and solemnity befitting sacred music.

The abbé Roze is one of the best singing masters, in point of taste, at Paris.

He has published a system of harmony, or accompaniment, in which he modestly pretends to no more than to assist the students in harmony with methodical elementary principles, so clear, that children of eight years old shall find no difficulty in them. It often happens that able composers are unable to teach children the first elements of music for want of a well digested method. This the abbé Roze's system will be found, with respect to accompaniment. He has traced the chords from the fundamental base or key-note, through all the combinations of harmony allowable by ancient rules in one key. Laborde, 1788.

ROZESTVEN, in *Geography*, a town of Russia; 32 miles S. of Peterburg. N. lat. 52° 20'. E. long. 29° 50'.

ROZESTVENSKOI, a town of Russia, in the government of Tobolsk; 16 miles S.E. of Kemskoï.—Also, a town of Russia, in the government of Archangel, on the Pinega; 4 miles S.E. of Pineg.

ROZETT, CAPE, a cape on the western coast of France. N. lat. 49° 28'. W. long. 2°.

ROZIER, FRANCIS, in *Biography*, an eminent writer in economics, was born at Lyons in 1734. His father, who was engaged in commerce, dying while he was young, and without property, he entered into the ecclesiastical order, though his taste led him to agricultural and botanical pursuits. He obtained the place of director of the school of Lyons. In this situation he joined La Tourette in publishing, in 1766, "Elementary Demonstrations of Botany," a work that passed through many editions. In 1771 we find him at Paris, where he began to publish the "Journal de Physique et d'Histoire Naturelle," which was conducted a considerable time with great reputation. In this work he gave clear and interesting accounts of all new discoveries in physics, chemistry, and natural history. Through the recommendation of the king of Poland, he was presented to a valuable priory, when, being completely at his ease, he turned his attention to his favourite project of drawing up a complete body of rural economy. He now purchased a domain at Beziers, in the finest part of France, and engaged actively in country labours, and at the same time employed himself in the abridgment of the great works from which his compilation was to be formed. This was at length finished, under the title of "Cours d'Agriculture," in 10 vols. 4to., of which the last did not appear till after the author's death. In 1788 he went to Lyons, and was admitted a member of the academy, while the

government gave him the direction of the nursery ground of the Generality. On the unfortunate revolution, Rozier was one of its earliest partizans, but without ever entering into its excesses. He was, however, one of its victims; in September 1793, during the siege of Lyons, a bomb falling upon his bed, buried his body in the ruins of his house. He was author, likewise, of several treatises on the method of making wines, and distilling brandy, on the culture of turnip and cole-seed, on oil-mills, and other machinery.

ROZIER, *Cape*, in *Geography*, a cape on the coast of Canada, in the gulf of St. Lawrence; 9 miles W. of cape Gaspe.

ROZIERES. See ROSIERES.

ROZOY, a town of France, in the department of the Seine and Marne, and chief place of a canton, in the district of Coulommiers. The place contains 1507, and the canton 13,199 inhabitants, on a territory of 312½ kilimètres, in 28 communes.

ROZOY en Thierache, a town of France, in the department of the Aisne; 21 miles N.E. of Laon.

ROZVALINA, TOTAGAI, a town of Russian Tartary, near lake Kargaldzin. N. lat. 52° 44'. E. long. 68° 54'.

RSECHOW, a town of Austrian Poland, in Galicia; 70 miles W. of Lemberg.

RUA, LA, a town of Spain, in Galicia; 25 miles N.E. of Orense.

RUAD, ROUAD, or *Rou-Wadde*, an island of the Mediterranean, anciently celebrated under the name of Aradus or Arad. N. lat. 34° 42'. E. long. 35° 57'. See ARAD.

RUADOK, or RUIWÆDOG, a village of North Wales, in the county of Merioneth, where a battle was fought between the Welsh, under Llywarch Hen and the Saxons; 2 miles E. of Bala.

RUALGO, a town of Italy, in the Cadorn; 4 miles S. of Cadorna.

RUANEL, a town of Ceylon; 38 miles S.S.W. of Candy.

RUARUS, MARTIN, in *Biography*, was born at Kremen, in Holstein, about the year 1587, and being designed for a Lutheran minister, he was educated in the principles professed by the disciples of Luther. But at Altdorf he became a convert to the Socinian doctrine, as taught in a private manner by professor Sonerus. When he was reproached and threatened by his family for deserting the principles of his forefathers, he justified his conduct, and defended the cause of free inquiry in matters of religion. Of his sincerity no doubt could be entertained, as he submitted to the loss of his patrimony rather than make a sacrifice of what he considered to be truth. He travelled over the greater part of Europe, and acquired respect and esteem wherever he went, by his great learning and excellent moral character. He was offered situations of trust and honour in England and Silesia, but declined them all. At length he became principal of the college of Racow in Poland; after which, about the year 1635, he became pastor to the Socinian church at Dantzig. In the year 1646, Calixtus used all his endeavours to bring him back to his original principles, but without effect. He died at Dantzig in 1657, at the age of 70. He wrote notes on the catechism of the Socinian churches in Poland, which were added to the addition of that work printed in 1665. Two volumes of his letters, each containing one hundred, were published after his death at Amsterdam. They are said to be curious and interesting, not only as they throw light on the history of Socinianism, but as they furnish the reader with valuable literary anecdotes. Among the author's

correspondents were father Merfenne, Hugo Grotius, and De Bergius.

RUÁTUN, or **RATTAN**, in *Geography*, an island in the bay of Honduras, about 30 miles in length and 12 in breadth, furrounded with rocks and shoals; with a harbour capable of containing a large fleet of ships. The English, in the year 1742, formed a settlement here for the purpose of carrying on the logwood trade, but it was soon abandoned. N. lat. 16° 24'. W. long. 87° 10'.

RUBASS, a town of Hindooftan, in the subah of Agra; 14 miles W. of Fattipour.

RUBBER, a large coarse file.

RUBBER of Pencil Strokes. See **CAOUTCHOUC**.

RUBBER, in *Electricity*. See **ELECTRICAL Machine**.

RUBBERS, among *Shepherds*, a disease in sheep. See **SCAB**.

RUBBING-POST, a post set up for the purpose of cattle, hogs, or other animals, rubbing themselves upon. Mr. Marshall, in his "Rural Economy of Norfolk," says, it is an excellent custom of the Norfolk farmer to erect rubbing-posts in the different parts of the inclosure he is feeding or teathing; they keep the stock from the fences, and furnish them, no doubt, with an agreeable, and perhaps a salutary, amusement. Some he saw draw the crown of a tree, with the lower part of the boughs left on, into the middle of the close: this is less trouble than putting down a post, is easily rolled out of the way of the plough, and seems to be still more agreeable to the cattle. They are also useful in hog-sties.

These sorts of posts may probably be found of great service in the feeding pasture, for the purpose of the fattening stock rubbing themselves upon, as they tend to keep them easy and quiet, as well as to afford them that kind of agreeable feeling which may be of utility in promoting their progress towards a state of fatness.

RUBBIO, in *Commerce*, a measure for corn in Italy, containing 8 lappa, which are equal to $7\frac{3}{4}$ English bushels.

RUBBLE STONE, *Grauwacke* of Werner, *Gres gris* of the French, is a particular kind of sand-stone, containing not only grains of quartz, siliceous schistus, or horn-stone, but also scraps of blueish argillite in a clayey cement, of which there is often no more than is barely sufficient to hold the grains together, sometimes with and sometimes without mica; commonly compact, sometimes flaty in the gros. Its colour is yellowish, or blueish-grey, or dark reddish-brown mixed with grey. Fracture, in the small, fine splintery, or earthy; hardness from 7 to 9, rarely 10. Sp. grav. from 2.64 to 2.685, but when withered only 2.60. See *Transition Rocks*.

RUBECULA, in *Ornithology*, a species of *Motacilla*; which see.

RUBEFACIENT, in *Medicine*, from *rubor*, *redness*, and *facio*, *I make*, or *produce*, a term which is used to denote those substances which, when applied externally, by friction or otherwise, excite the action of the superficial vessels, and, by filling them with red blood, occasion a suffusion of redness in the part.

The operation of a rubefacient is, therefore, analogous to that of a blister, but considerably less efficient as a remedy; since it produces, in fact, but a small degree of the incipient effect of a blister, *viz.* a very slight and superficial distension of the blood-vessels, scarcely amounting to inflammation. Rubefacients are employed under the same indications as blisters, and are intended, like them, to relieve some internal pain or inflammation, by exciting a counter-irritation, or, as some explain it, by revulsion; *i. e.* by drawing the fluids from the diseased to the external parts. The friction, by

means of which the rubefacient is usually applied, contributes also to the same effect.

The substances, by which this effect is produced, are of an acrid or stimulating nature, such as ammonia, turpentine, camphor, vinegar, the essential oils, spirits, &c.: and the diseases, which they are ordinarily used to relieve, are the slighter degrees of local internal inflammation. Thus, for the relief of a slight sore-throat, or inflammation of the tonsils, it is customary to rub the front of the neck with hot vinegar, or ammonia and oil; and the more external redness it produces, the more effectual is the internal relief. Slight pains in the chest are often materially alleviated by the use of a warm liniment or plaster, or by the use of the ointment of tartarized antimony, which excites not only redness, but pustules. And rheumatic affections of the joints are often more effectually removed by friction with a rubefacient, than by any other means. See **REVULSION**.

RUBELLIO, in *Ichthyology*, a name given by some authors to a small sea-fish of a red colour, caught in the Mediterranean, and more usually called by writers on these subjects the *erythrinus*.

RUBELLITE, in *Mineralogy*, is considered as a subspecies of tourmaline, of a reddish-violet colour. It differs from tourmaline, being infusible under the blowpipe, but it loses its colour and transparency. Its specific gravity is 3.1. It contains, according to Klaproth,

Silex	-	-	43.5
Alumine	-	-	42.25
Soda	-	-	9
Oxyd of iron and manganese	-	-	1.5

A specimen analysed by Vauquelin gave 7 parts in the 100 of oxyd of iron and manganese. This stone is sometimes used in jewellery. In the Greville collection of minerals in the British Museum, there is a magnificent specimen of the red rubellite, originally presented to Col. Symes by the king of Ava. It has been valued at 1000*l*.

RUBELLUS, in *Ichthyology*, a name given by some authors to the common roach, and by others to the rudd or finscale.

RUBENACH, in *Geography*, a town of France, in the department of the Rhine and Moselle, and chief place of a canton, in the district of Coblenz. The place contains 567, and the canton 6935 inhabitants, in 19 communes.

RUBENS, *Sir PETER PAUL*, in *Biography*. This most singularly accomplished man, and extraordinary painter, was the son of John Rubens and Mary Pipelings, both descendants of distinguished families of the city of Antwerp. His father was one of the principal magistrates of that place, when civil war desolated Flanders; and its calamities approaching the precincts of his abode, he left it for Cologne, in which city our artist was born in 1577. The day of his nativity was the feast of St. Peter and St. Paul, and from thence he received, at the baptismal font, the names of these apostles. From his infancy he discovered prompt and lively talents, which were cultivated by his parents with great care, in every branch of polite and classical literature; and he amply repaid their care by the high degree of success he attained.

The views of his parents were otherwise directed than to the arts, and Rubens was placed, when his education was completed, as a page to the countess of Lalain; a situation too humble, and attended with occupation too trivial, to engage or detain long, in its obsequious frivolities, such a mind as he possessed: and on the death of his father, which happened soon after, he obtained permission of his mother to pursue the bent of his inclination, and became a painter.

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To forward this view, he placed himself as a disciple of Tobias Verhaecht, a landscape painter of some note, but soon left him, to study history painting under Adam Van Oort. As the vulgar and brutal deportment of that artist were little congenial to the elevated and gentle mind and disposition of Rubens, he soon quitted him also, and then entered the school of Otho Venius, who possessed qualities, both as a man and an artist, far more suited to his taste; and he became attached to this his last preceptor, in the warmest and most respectful degree.

When Rubens had attained his twenty-third year, Otho had the candour to tell him that he could no farther promote his progress; and advised him to travel to Italy, and gather the rich fruit of higher cultivation in art, at that rich storehouse and fertile nursery of taste and talent. This wise and parental advice of his master corresponded so entirely with his own inclination, that he immediately prepared for the journey; and having received strong recommendatory letters from the archduke Albert, governor of the Netherlands, to Vincenzio Gonzaga, duke of Mantua, he set forth for Italy.

Devoting a short time to the examination of the fine works at Venice, he proceeded to Mantua, where he received most marked attention from the duke, who was no less pleased with his polite accomplishments, than with his skill as an artist, and soon after appointed him one of the gentlemen of his chamber. His residence with this prince afforded him every desirable means of seeing and studying the great works of Giulio Romano, in the palace del T, with which he is said to have been peculiarly delighted; and he had continued with him two years, when he requested permission to go to Venice, the empire of colouring, for the purpose of studying still farther the works of Titian and others, which had so much engaged his attention as he passed through that city. On his return to Mantua he evinced how much he had benefited by studying the rich and brilliant productions of the Venetian school, in the three magnificent pictures he painted for the church of the Jesuits; which, in bravura of execution, and freedom of force in effect, rank nearly among his best productions. His patron afterwards gave him a commission, which afforded him the means of pursuing his studies at Rome, where he had not yet been, which was to make copies for him of some of the most celebrated pictures there, and he received it with gratitude and delight. During his residence there he executed several of these transcripts with uncommon success, and they were esteemed by the duke almost equal in value with the originals.

In 1605, Rubens was honoured by his friend with another commission, which still further assisted to advance his knowledge of the art, whilst it served the views of the prince. He was sent on an embassy from Mantua to the court of Spain, and went to Madrid, carrying with him magnificent presents for the duke of Lerma, the favourite of Philip III. He executed his mission with the success which attends ability and integrity; and while intent upon the political part of his employment, did not neglect to employ his pictorial talents with full power, gaining the esteem and admiration of the king of Spain, whose portrait he painted, and from whom he received the most flattering marks of approbation.

Soon after his return to Mantua, he revisited Rome, where he was engaged to adorn the tribune of Sta. Maria, in Valticella; there he painted three admirable pictures, in which he appears to have imitated the style of P. Veronese. From Rome he went to Genoa, where the reputation he had acquired greatly excited public curiosity, and he was engaged to paint many pictures. Among them he executed

two for the church of the Jesuits, the subjects of which were, the Crucifixion, and St. Ignatius performing a miracle, which gave universal satisfaction and delight.

Having been absent from his native country eight years, he was summoned home by the reported illness of his mother; but though he hastened with all speed, he did not reach Antwerp in time to afford his beloved parent the consolations of his presence and affections. The loss of her affected him deeply, and he intended, when he had arranged his private affairs, to go and reside in Italy; but the archduke Albert, and the Infanta Isabella, exerted their interest to retain him in Flanders, and in their service. He consequently established himself at Antwerp, where he married his first wife, Elizabeth Brants, and built a magnificent house, with a saloon in form of a rotunda, which he enriched with antique statues, busts, vases, and pictures by the most celebrated painters: and here, surrounded by works of art, he carried into execution those numberless productions of his prolific and rich invention, which once adorned his native country, but now are become the spoil of war, and the tokens of conquest and ambition, shining with equal lustre among other super-eminent productions of painting in the gallery of the Louvre.

The amazing success of Rubens in his art, and the honours and wealth which were accumulated upon him, excited the envy and malignity of many among his rivals, who ascribed the most meritorious parts of his works to the ability of his pupils, among whom were Jordaens, Van Uden, Snyders, Wilden, &c. and forgetting that such men would not consent to work for another whom they did not regard as pre-eminent to themselves. Cornelius Schut abused him for lack of invention. Abraham Jansens had the audacity to defy him to a trial of strength. Rubens answered, that he would contend with him when he had shewn himself to be a worthy competitor. A more friendly offer was rejected by him with equal wit. A chemist offered him a share of his laboratory, and of his hopes of obtaining the philosopher's stone. He carried the visionary into his painting room, and told him his offer came twenty years too late, for so long, said he, is it since I found the art of making gold with my palette and pencils. The abuse of Schut and of Rombouts, who joined in it, he answered by relieving their necessities, and procuring them employment; and by engaging in those varieties of art, landscapes, lion and crocodile-hunting, and other miscellaneous subjects, he decidedly established his claim to the title of an universal painter, and covered his calumniators with shame and confusion.

In 1620, when his talents had procured him universal renown, he received a commission from Mary de Medici to adorn the gallery of the palace of the Luxembourg. There, in consequence, he executed the works so well known; in which he represented, with the most rich and varied imagination, by very ingenious allegorical and emblematical designs, the principal events in the life of that princess. The whole were executed at Antwerp, except two pictures, which he painted at Paris in 1623, when he went there to arrange the whole in the gallery: and thus, in the short space of three years, amidst innumerable other engagements, was this large series of compositions, extensive in their design, and rich in number of figures and in variety of colouring, completed: exhibiting an astonishing proof of the vivacity of his imagination, and the skill and dexterity with which he controlled the materials of his art. It was at this period that he became known to the duke of Buckingham, as that nobleman passed with his master, prince Charles, through France on his way to Madrid. He afterwards became the purchaser of Rubens's

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rich museum of works of art, for which he is said to have given 10,000*l.* sterling.

On the return of Rubens to Antwerp, he was honoured with several conferences with the Infanta Isabella, and was by her dispatched on a political mission to the court of Madrid, where he arrived in 1628, and was most graciously received by Philip IV. He acquitted himself in his novel capacity to the satisfaction of that monarch, and his minister, the duke de Olivares, by both of whom he was highly esteemed; and while his talents as a diplomatist met with the success they merited, those of the painter were not neglected.

The duke de Olivares had just completed the foundation of a convent of Carmelites at the small town of Loeches, near Madrid, and the king, as a mark of his favour to the minister, commissioned Rubens to paint four pictures for their church, which he executed in his grandest style, and the richest glow of his colouring. The first is an allegorical design of the triumph of the new Law, which he has personified by a figure of Religion, seated on a superb triumphal car, drawn by four angels, with others bearing the cross, with characteristic symbols; four figures, expressive of Infidelity or Ignorance, over which Religion is supposed to triumph, follow the car like slaves or captives bound in chains. The group is crowned with beautiful cherubims, that hover in the air with chaplets in their hands, disposed with singular art and the most charming effect. The companion picture represents the interview of Abraham and Melchisedech, who offers him bread and the tenth of his spoils. The other two pictures, of equal excellence with the above, represent the four doctors of the church, and the four evangelists, with their distinctive emblems: they are all of very large dimensions, and in composition and expression are not excelled by any of his works. He also painted eight grand pictures for the great saloon of the palace at Madrid, which are regarded among the most brilliant of his productions. Their subjects were the Rape of the Sabines; the battle between the Romans and Sabines; the Bath of Diana, Perseus, and Andromeda; the Rape of Helen; the Judgment of Paris, Juno, Minerva, and Venus; and the Triumph of Bacchus. He also painted a large portrait of the king on horseback, with other figures; and a picture of the martyrdom of the apostle St. Andrew, which was in the church dedicated to that saint. For these extraordinary productions he was richly rewarded, received the honour of knighthood, and was presented with the golden key as gentleman of the chamber to the king. In 1629 he returned to Flanders, and thus, in the short space of little more than nine months, he designed and executed so extensive a series of pictures; a labour which, to any other artist not possessed of his extraordinary powers, must have required the exertion of many years. When he had rendered the account of his mission to the Infanta, she dispatched him to England, to sound the disposition of the government on the subject of a peace. There for a time he concealed the powers granted to him to negotiate upon the subject. Charles, in the interim, honoured this great painter with his notice, and commissioned him to paint the ceiling of the banqueting-house at Whitehall, where he has represented the apotheosis of king James I.

During one of the frequent visits with which Charles honoured Rubens, whilst he was engaged in this great work, the latter, with infinite address, took a favourable opportunity of touching on the subject of peace with Spain; and finding that the monarch was no ways averse to it, at length produced the credentials with which he was furnished. The king appointed some members of the council to negotiate with him; and the business was speedily

brought to a conclusion. Charles, delighted both with the man and the artist, munificently rewarded Rubens, and on the 21st of February 1630, conferred upon him the honour of knighthood. Soon afterwards, the important object of his mission being happily effected, he returned to the Netherlands, where he was received with all the honours and distinctions due to exalted merit.

Rubens continued to enjoy his well-earned fame and honours, with uninterrupted success, till he arrived at his 58th year, when he was attacked with strong fits of gout, which debilitated his frame, and unfitted him for great exertions: he abandoned, therefore, all larger works, and confined himself to easel painting. Yet he continued to exercise his art until the year 1640, when he died, at the age of 63. He was buried, with extraordinary pomp, in the church of St. James at Antwerp, under the altar of his private chapel, which he had previously decorated with a very fine picture. A monument was erected to him by his wife and children, with an epitaph in Latin, eulogizing his talents and virtues, and displaying their success.

The victorious yet barbarous irruption of the French republicans into the Netherlands, robbed Flanders generally, and no place more than Antwerp, of the fine historical works of Rubens, of which at this period the gallery of the Louvre exhibits a most astonishing display; no less than fifty-two of his pictures, and among them several of the highest quality, being now exposed to view there. It is difficult to say which branch of the art most successfully employed his talents, in history, portraiture, animals, landscape, or still life: in all, his brilliancy of imagination, and wonderful skill in execution, are equally apparent. From his birth he had evinced a lively and uncommon portion of genius, which met the advantages furnished to him in his progress through life, with an ardour and success of which history scarcely affords a parallel. Both the number and merit of the works of Rubens are calculated to excite extraordinary attention. His fame is extended over a large part of the continent, and it may be truly said, that he has enriched his country, not only by the magnificent examples of art which he left, but also by what some may deem a more solid advantage, the wealth which continued till lately to be drawn into it, by the concurrence of strangers from all parts of the world to view them.

Rubens is not one of those regular and timid composers, who escape censure and deserve no praise. He produced no faultless monsters; his works abound with defects as well as beauties, and are liable, by their daring eccentricities, to provoke much criticism. But they have, nevertheless, that peculiar property, always the companion of true genius, that which seizes on the spectator, commands attention, and enforces admiration, in spite of all their faults. His productions seem to have flowed from his pencil with more than freedom—with prodigality: his mind appears to have been inexhaustible; his hand never wearied: the exuberant fertility of his imagination was, therefore, always accompanied by a correspondent spirit in the execution of his work.

“Led by some rule, which guides but not constrains,
He finished more through happiness than pains.”

No man ever more completely laid the reins on the neck of his inclinations, no man ever more fearlessly abandoned himself to his own sensations, and depending on them, dared to attempt extraordinary things, than Rubens. To this, in a great measure, must be attributed that perfect originality of manner, by which the limits of the art may be said to have been extended. Endowed with a full comprehension

prehesion of his own character, he waited not a moment for the acquisition of what he perhaps deemed incompatible excellence: his theory once formed, he seldom looked abroad for assistance; there is consequently in his works very little that appears to be taken from other masters, and if he has occasionally stolen any thing, he has so well digested and adapted it to the rest of his composition, that the theft is not discoverable. But though it must be allowed that he possessed, in many respects, the true art of imitation, though he looked at nature with a painter's eye, and saw at once the characteristic feature by which every object is distinguished, and rendered it on canvas with a vivacity of touch truly astonishing; though his powers of grouping and combining his objects into a whole, and forming his masses of light and shadow and colour have never been equalled; and though the general animation and energy of his attitudes, and the flowing liberty of his outline, all contribute to arrest the attention, and inspire a portion of that enthusiasm by which the painter was absorbed and carried away; yet the spectator will at last awake from his trance, his eyes will cease to be dazzled, and then he will not fail to lament, that such extraordinary powers were so often misapplied, if not entirely cast away: he will enquire, why Rubens was content to waste so many requisites to the perfection of the art? why he paid no greater attention to elegance and correctness of form, to grace, to beauty, dignity, and propriety of character? Why every subject, of whatever class, is equally adorned with the gay colours of spring, and every figure in his compositions indiscriminately *sed on roses*. Nor will he be satisfied with the ingenious, but surely unfounded apology, that these faults harmonize with his style, and were necessary to its complete uniformity, that his taste in design appears to correspond better with his colouring and composition, than if he had adopted a more correct and refined style of drawing; and that perhaps, in painting, as in personal attractions, there is a certain agreement and correspondence of parts in the whole together, which is often more captivating than more regular beauty.

The redemption of what he wanted, is found in the universality of his power as an executive painter. In the smallest sketch, the lightness and transparency of his touch and colour, are no less remarkable than the sweeping rapidity and force of his brush in his largest works: and in all kinds of subjects, he equally keeps up his wonted superiority. His animals, particularly his lions and horses, are so admirable, that it may be said they were never properly, at least poetically, painted, but by him; his portraits rank with the best works of those painters who have made that branch of art their sole study; and his landscapes remind us of the lustre of Claude Lorraine and the grandeur of Titian. In the latter class of his works, the picturesque forms of his rocks and trees, the deep tones in his shady glades and glooms, the watery sunshine, the dewy verdure, the airiness and facility of his touch, exhibit a charm, and shew a variety of invention, which fascinate the observer, and leave him no inclination to dwell on the defects, though they are often neither few nor small.

As a colourist, Rubens, in comparison with Titian, the great master of the Venetian school, will rise or fall, according to the taste of the amateur. If he is less chaste than the Venetian, he is more brilliant; and if not by the truth of his colours, yet he claims our applause by the lustre and splendour of his tints. The latter, in his execution, mingled his hues as they are found in nature, in such a manner as to make it impossible to say where they begin or terminate; Rubens, on the other hand, laid his colours in their

places, one by the side of the other, and then very slightly mixed them by a touch of a soft pencil; not unfrequently leaving his prepared ground visible through parts of the colours, to produce an harmonizing tone. Of these different styles, the only correct mode of judging is by reference to the specific object of art, *the imitation of nature*, and then Titian's will be regarded as the most correct, though Rubens may be more alluring.

RUBENS, ALBERT, son of Peter Paul, was born at Antwerp in 1614, and succeeded his father in his post as secretary to the council, devoting his leisure to literary pursuits. He died in 1657, leaving behind him many works, as monuments of his great learning and sound judgment, of which the following may be mentioned. "Regum et Imperatorum Romanorum Numismata," which is a commentary on the medals of the duke of Arfehot: "De Re Veltiaria Veterum:" "Dissertatio de Gemma Tiberiana et Augustea—de Urbibus Neocoris—de natali Die Cæsaris Augusti," which were published by Grævius in the *Theaurus Antiq. Roman.*

RUBENTIA, in *Botany*, so called by Commerçon, from the vernacular name of the tree in the Mauritius, *Bois Rouge*; see *ELÆODENDRUM*. See also *RHAMNUS pentaphyllus*, where we ought to have observed that the plant of Desfontaines and Boccone is very different from *Elæodendrum argan*, to which the synonyms of Linnæus and Jacquin most probably belong, as cited in our vol. 12th.

RUBEOLA, the diminutive of *Rubia*; Tourn. Inst. 130. t. 50. See *ASPERULA* and *CRUCIANELLA*.

RUBETA, or TOAD, in *Zoology*, a species of *Rana*; which see.

RUBETRA, in *Ornithology*, a species of *Motacilla*; which see. It is also a name by which Gesner and some others have called that species of the *œnanthe*, commonly known by the names of the *stone-chatter*, *stone-smuck*, or *moortitling*. (See *MOTACILLA Rubicola*.) Other species of *Motacilla* are also called by the same name. See also *MUSCICAPA* and *PIPPA*.

RUBIA, in *Botany*, derived from *ruber*, red, on account of the fine scarlet colour afforded by its root; which is well known to dyers and tanners under the name of Madder.—Linn. Gen. 52. Schreb. 69. Willd. Sp. Pl. v. 1. 603. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 181. Prodr. Fl. Græc. Sibth. v. 1. 97. Ait. Hort. Kew. v. 1. 242. Juss. Gen. 197. Tournef. t. 38. Michaux Boreal-Amer. v. 1. 81. Pursh v. 1. 102. Lamarek Illustr. t. 60.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Stellata*, Linn. *Rubiaceæ*, Juss.

Gen. Ch. *Cal.* Perianth superior, of one leaf, four-toothed, very small, or none. *Cor.* of one petal, bell-shaped, four-toothed, or more frequently five-cleft, without a tube. *Stam.* Filaments four, awl-shaped, shorter than the corolla; anthers simple. *Pist.* Germen inferior, twin; style thread-shaped, cloven at the top; stigmas two, capitate. *Peric.* Two smooth berries united into one. *Seeds* solitary, roundish, umbilicated.

Est. Ch. Corolla of one petal, bell-shaped, superior. Berries two, combined, each with a single seed.

1. *R. tinctorum*. Dyer's Madder. Linn. Sp. Pl. 158. Sm. Fl. Græc. Sibth. t. 141. Woodv. Med. Bot. t. 68.—Leaves elliptic-lanceolate, annual, about six in a whorl, rough at the keel. Stem prickly.—Native of the south of Europe, flowering in June. Root perennial, widely spreading, much divided and branched at the top, succulent, its bark principally affording a scarlet dye. *Stems* herbaceous, annual, decumbent, widely spreading, branched, leafy, obtusely quadrangular, prickly, with little hooks at the angles.

RUBIA.

gles. *Leaves* spreading, acute, an inch and half long, roughish above, narrowed at the base into a short, broad footstalk; at the margin and back of the rib rough with spines, which for the most part point backwards, but in a contrary way towards the tip. *Flowers* yellowish-green, in axillary, terminal, trichotomous, leafy or bracted, rough panicles, longer than the leaves. *Berries* dark-purple.

The cultivation of this useful plant in Great Britain by no means keeps pace with the demand for it. That grown in Holland is the most esteemed by our dyers and calico-printers. Dr. Sibthorp tells us it is much cultivated in the neighbourhood of Athens.—Madder has the property of tinging, with its bright colour, not only the milk, but even the bones of such animals as feed upon it.

2. *R. chilensis*. Chili Madder. Willd. n. 2. "Molina Nat. Hist. Chili. 118." (*Rubiastrum, Cruciatæ folio et facie, vulgo Relbun; Feuillée Peruv. 60. t. 45.*)—Leaves annual, four in a whorl. Stalks axillary, solitary, single-flowered. Stem smooth.—Native of Chili, on mountains. *Root* perennial, much divided and spreading, affording a dye like the last. *Stems* round, slender, somewhat creeping. *Leaves* ovate, four together, forming a cross, rough and sticking to the clothes. *Flowers* axillary, solitary, stalked, white. *Berries* roundish, red.

3. *R. peregrina*. Wild English Madder. Linn. Sp. Pl. 158. Fl. Brit. n. 1. Engl. Bot. t. 851.—Leaves about four in a whorl, elliptical; shining and smooth on their upper side. *Flowers* five-cleft. Not uncommon in the south-west of England, among bushes, on a rich loamy soil, flowering in July, and ripening its berries about October.—*Root* perennial, red, or orange-coloured. *Stems* branched, diffuse, square, rough at the angles, perennial. *Leaves* four, rarely six together, evergreen, pointed, rough, with teeth at the margin, and nerves on the under side. *Flowers* in forked panicles, terminal, yellowish, always five-cleft and pentandrous, without a calyx. *Berries* black, one of them generally abortive.

It is remarked in the Flora Britannica, that *Rubia*, n. 708 of Haller, which has been confounded with this species, is unquestionably *R. tinctorum* of Linnæus, having ovato-lanceolate leaves, rough on the upper side, and flowers which are mostly four-cleft, destitute of a calyx.

4. *R. lucida*. Shining-leaved Madder. Linn. Syst. Nat. ed. 12. v. 2. 732. Willd. n. 4. Sm. Fl. Græc. Sibth. t. 142.—Leaves elliptical, evergreen, six in a whorl, smooth at the keel. Stem without prickles. Native of Majorca, and the islands of Zante and Cyprus. It flowers in July. *Root* perennial, branched, much divided at the crown. *Stems* rather shrubby, a little spreading, much branched, unarmed, clothed with roughish down; jointed, roundish, leafless and grey in the lower part; leafy and square in the upper. *Leaves* spreading, recurved, half an inch long, sessile, pointed, smooth on both sides, thickened at the margin, rough with spines pointing forwards. *Flowering* in axillary, numerous, trichotomous panicles, of a yellowish-green.

5. *R. fruticosæ*. Prickly-leaved Madder. Willd. n. 5. Jacq. Ic. Rar. t. 25.—Leaves evergreen, elliptical, carinated; prickly at the margin. Stem shrubby, rough.—Native of the Canary islands, and flowering at Kew in September.—*Stem* woody, round, much branched, of a greyish-brown colour; the younger branches angular, very rough, green. *Leaves* from three to seven together, smooth, except at the edges and back of the rib. *Flowers* on axillary, short stalks, solitary or three together, pale yellow. *Berries* roundish, black, with purple pulp.

6. *R. angustifolia*. Narrow-leaved Madder. Linn.

Mant. 39. Willd. n. 6.—Leaves evergreen, linear, smooth on the upper side.—Native of Minorca, and introduced at Kew, in 1772, by M. Richard, where it flowers in July and August.—*Stems* diffuse, very rough, square. *Leaves* four or six in a whorl, linear, acute, their keel and margin fringed with small prickles, and rugged along the rib of the upper surface. *Flowers* yellow, flat, five-cleft.

7. *R. cordifolia*. Heart-leaved Madder. Linn. Mant. 197. "Pallas. It. v. 3. 715. t. L. f. 1." (*R. cordata; Thunb. Japon. 60.*)—Leaves perennial, four in a whorl, heart-shaped.—Native of the Cape of Good Hope, Siberia, China, and Japan; flowering at Kew in July.—Whole herb diffuse, or slightly climbing. *Stem* square, branched, with recurved prickles at the angles. *Leaves* four, rarely six, together, ovate, acute, revolute at the edge, rugged all over and dotted, on quadrangular stalks. *Flowers* white, in spreading, axillary, terminal panicles. Thunberg informs us that this species is used in Japan for dyeing.

8. *R. Brownei*. Brownean Madder. Michaux Boreal. Amer. v. 1. 81. Pursh 102. (*R. peregrina; Walt. Fl. Carol. 86.*—*R. subulifluta scandens vel reclinata, foliis cruciatis floribus singularibus ad alas; Brown Jam. 141.*—*Valantia hypocarpa; Linn. Sp. Pl. 1491.*)—Leaves four in a whorl, oval. *Flowers* on stalks, solitary.—Found in shady woods from Carolina to Florida, and on the cool mountains of Jamaica. *Stem* herbaceous, from one to three feet high, loose, branched, grooved, rugged. *Leaves* sessile, small, entire, convex, hispid with hairs, on short downy stalks. *Flowers* axillary, small, yellow, like those of a *Galium*. *Berries* minute, tawny, or purplish, single-seeded.

RUBIA, in Gardening, contains plants of the hardy, herbaceous, perennial kind, of which the species mostly cultivated is the dyer's madder (*R. tinctorum*).

It may be noticed, that madder is so essential to dyers and calico-printers, that these businesses cannot be carried on without it.

Method of Culture.—The young plants of this kind are increased by off-sets or suckers, from the roots of the old plants in the spring, as April or the following month; which should be slipped off soon after they appear above ground, by opening the earth round the roots, and taking off the side suckers with as much root-part and fibres to each as possible, preserving the tops entire; which should be planted directly, in the manner directed below. The ground being well prepared by frequent deep ploughing, or trenching over, and the proper quantity of sets or suckers provided, they should, with a dibble, be planted in rows two feet asunder, and one distant in the row, putting each plant low enough in proportion to the length of its root, leaving most of the green top out of the ground, and closing the earth well about each set, as the work proceeds. Some set these plants in beds, three rows length-ways, at two feet distance, with wide alleys between bed and bed, in order for landing up the crowns of the roots two or three inches deep in winter. They shoot up into stalks the same year in either mode, but the roots require two or three years' growth before they are large enough for use; during which period they should be kept clean from weeds all the summer by broad-hoeing, in dry weather; and in autumn, when the stalks decay, cutting them down, and then slightly digging the ground between the rows, raising it somewhat ridge-ways along the rows of the plants, an inch or two thick over their crowns; or, if they are in beds, they may be landed up from the alleys to the same depth; the same culture being repeated till the autumn of the third year, when the roots will be fit for taking up for use. This is performed by trenching the ground the way of the rows, beginning at one end of it, and

and opening a two-feet-wide trench close along by the first row of plants, digging down to the depth of the roots to get them clean out to the bottom; then opening another trench close to the next row, turning the earth into the first; and so on, trench and trench, till the whole is taken up and removed.

It is found that, in the garden culture, these plants succeed best in a light rich deep soil; the roots are sometimes used fresh for dyeing, being prepared by washing and pounding; but commonly when designed for keeping, or to be sent to a distance, are dried in some covered airy shed; then all the mould being rubbed off, and the roots made sufficiently dry, are sold to those who manufacture them for use, if not performed by the cultivator; this consists in drying them in a kiln or some stove-house, &c. then thrashing them to beat off the outer skin, in order to separate it from the inner part of the root, as being of an inferior quality. The roots being then dried in a kiln about twenty-four hours, are removed to a mill or pounding-house, where they are pounded in a long hollow oaken block, with stampers kept in motion by the mill; and when thus reduced to powder, sifted, and put in casks, as may be more fully seen under the head Madder, in *Agriculture*.

But these plants are sometimes employed for variety in the borders or other open parts of gardens or pleasure-grounds, when of large extent.

RUBIA, in the *Materia Medica*, &c. See Madder.

RUBIA, in *Geography*, a town of Austria, in the county of Goritz, on the Vipao; four miles S.E. of Goritz.

RUBIACEÆ, in *Botany*, one of Jussieu's largest and most important natural orders of plants, which has grown out of the Linnæan *Stellata*, and is named from *Rubia*, a genus belonging to the latter. Linnæus, in subordinate sections of his *Stellata*, has indicated some genera, as akin to what more strictly appeared to him to constitute that order. But his ideas wandered between this tribe and the *Contortæ*, to which last he referred some genuine *Rubiaceæ*; as *Cinchona* and *Gardenia*. Jussieu, taking a more accurate and comprehensive view of the subject, has greatly extended the order, while he has, at the same time, better defined it than any preceding botanist. This order is the 57th of his series, the 2d of his 11th class. We refer the reader to *DIPSACÆ* for the characters of that class. *Cotyledons* two. *Flowers* monopetalous, superior. *Anthers* distinct; &c. The order of *Rubiaceæ* is thus defined.

Calyx of one leaf, superior, simple; its limb divided, or occasionally undivided. *Corolla* regular, mostly tubular, with a divided limb. *Stamens* definite, four or five, seldom more, inserted into the tube of the corolla, alternate with its segments, and equal to them in number. *Germen* inferior; style one, very rarely double; stigma generally double. *Fruit* in some cases of two lobes, or grains, each lobe single-seeded, not bursting, but having the appearance of a naked seed; in others a simple capsular or pulpy fruit, often of two cells, in each of which the seeds are either solitary or numerous; in a few instances there is but one cell, in some others many; the fruit, of whatever description, is either crowned with the permanent limb of the calyx, or marked with a rim, or sear, where the latter had been. The *coraculum* is oblong, slender, inclosed in a large, horny, lateral albumen. *Stem* herbaceous, shrubby, or arborescent. *Leaves* in a few instances whorled, in most opposite, their *footstalks* generally connected at the base, through the medium of a simple pair of *stipulas*, or sometimes a fringed kind of sheath, embracing the stem or branch. Plants of this order are readily known, even without flowers, by their *leaves* or

Aipulas. The shrubby and arborescent kinds are principally natives of tropical climates, where they greatly abound.

Section 1. *Fruit* two-lobed, with two seeds. *Stamens* generally four. Leaves mostly whorled; stem almost uniformly herbaceous.

Sherardia, *Asperula*, *Galium*, *Crucianella*, *Valantia*, *Rubia*, and *Anthospermum*.

Section 2. *Fruit* two-lobed, with two seeds. *Stamens* four, rarely five or six. Leaves mostly opposite, connected by a fringed sheath; stem in general herbaceous.

Houstonia, *Knoxia*, *Spermacoce*, *Diodia*, *Galopina*, *Richardia*, and *Phyllis*.

Section 3. *Fruit* simple, with two cells, and many seeds. *Stamens* four. Leaves opposite. Stem either herbaceous or shrubby. *Hedyotis*; *Oldenlandia* of Plumier and Linnæus, which is not distinct from *Hedyotis*, as we have shewn in its proper place; *Carphalea* of Jussieu, Lamarek Illustr. t. 59; *Coccyosyphium* of Bröwne and Schreber; *Gomozia*; *Manettia* of Linnæus, for which Jussieu prefers Aublet's name *Nacibea*; *Tontanea* of Aublet, supposed to be Schreber's *Bellardia*; *Petesia* of Bröwne and Linnæus; *Fernelia* of Commerçon, Lamarek Illustr. t. 67; and *Catesbea*.

Section 4. *Fruit* simple, with two cells, and many seeds. *Stamens* five. Leaves opposite; stem often shrubby.

Randia, which is a *Gardenia*; *Bellonia*; *Vireta*; *Macrocrocnemum*; *Bertiera* of Aublet and Schreber; *Dentella* of Forster; *Mussaenda*; *Cinchona*; *Tocoyena* of Aublet, Lamarek Illustr. t. 163; *Posoqueria* of the same authors, which is *Cyrtanthus* of Schreber; *Rondeletia*; *Genipa* of Plumier and Linnæus, which is a *Gardenia*; *Gardenia*; and *Portlandia*.

Section 5. *Fruit* simple, with two cells, and many seeds. *Stamens* six, or more. Leaves opposite; stem shrubby or arborescent.

Coutarea of Aublet, which is *Portlandia hexandra* of Linnæus; *Hillia*; and *Duroia*.

Section 6. *Fruit* simple, with two cells and two seeds. *Stamens* four. Leaves opposite; stem for the most part shrubby.

Chomelia of Jacquin; *Pavetta*; *Ixora*; *Couffarea* of Aublet; *Malanea* of the same, which is Schreber's *Cunninghamia*; and *Antirrhæa* of Commerçon.

Section 7. *Fruit* simple, with two cells and two seeds. *Stamens* five. Leaves opposite; stem shrubby or arborescent.

Chimarrhis of Jacquin; *Chiococca*; *Ptychotria*; *Coffea*; *Canthium* of Lamarek, which is a *Gardenia*; *Ronabea* of Aublet, Lamarek Illustr. t. 166; *Pæderia*; *Coprosma*; and Aublet's *Simira*.

Section 8. *Fruit* simple, with many cells, each containing a solitary seed. *Stamens* four, five, or more. Leaves opposite; stem often shrubby.

Nonatelia of Aublet, which is scarcely different from *Ptychotria*; *Laugeria*; *Erihalis*; *Pfathura* of Commerçon, Lamarek Illustr. t. 260; *Myonima* of Commerçon, *ibid.* t. 68; *Pyrosria*, *ibid.* t. 68; *Vangueria*, *ibid.* t. 159; *Matthiola* of Plum. and Linn.; and *Guetarda*.

Section 9. *Fruit* simple, with many cells, each containing many seeds. *Stamens* five, or more. Leaves generally opposite; stem either shrubby or herbaceous.

Hamellia; *Patima* of Aublet, Lamarek Illustr. t. 159; and *Sabicea* of Aublet, which is Schreber's *Schwenkfeldia*.

Section 10. *Flowers* aggregate upon a common receptacle; the fruit sometimes, but rarely, confluent. Leaves opposite; stem arborescent or shrubby, rarely herbaceous.

Mitchella; *Canephora* of Jussieu, Lamarek Illustr. t. 151; *Patabea* of Aublet; *Evea* of the same, also *Tapogomea*, both compre-

comprehended by Schreber under *Callicocca*; *Morinda*; *Nauclea*; and *Cephalanthus*.

SECT. 10. *Rubiaceous genera, with the nature of whose fruits Jussieu was not, as yet, sufficiently acquainted.*

Serissa of Commerfon, Lamarck Illuſtr. t. 151, which L'Heritier named *Bucozia*; and found to have a berry with two feeds; *Pagamea* of Aublet, Lamarck Illuſtr. t. 88; *Farama* of the ſame, ibid. t. 63; and *Hydrophyllax* of Linn. Suppl.

RUBICAN, in the *Manege*. A horſe is ſaid to be of a rubican colour, that is a bay, ſorrel, or black, with a light grey or white upon the flanks, but ſo that this grey or white is not predominant there.

RUBICILLA AMERICANA, in *Ornithology*, a name given by Mr. Ray to the *guiratririca*, a Braſilian bird, of the bull-finch kind, very beautifully variegated with red, black, and grey.

RUBICOLA, a ſpecies of *Motacilla*; which ſee.

RUBICON, in *Geography*, a river of Italy, famous in Roman hiſtory, now a diminutive ſream, and called by ſome *Fiumefino*, and by others *Pifatello* (which ſee), which enters the Adriatic about eight miles N. of Rimini.—Alſo, a department of Italy, compoſed of part of the Romagna. It contains about 105,000 inhabitants, who elect 12 deputies. The capital is Rimini.

RUBICULUS, in *Ichthyology*, a name given by Figulus and ſome others to that ſpecies of fiſh which we call the *roach*. It is of the cyprinus kind, and is diſtinguiſhed by Ardedi under the name of the red-eyed cyprinus, with the tail and belly-fins red. See CYPRINUS.

RUBIELOS, in *Geography*, a town of Spain, in Aragon; 22 miles S. E. of Teruel.

RUBIERA, a town of Italy, in the department of the Panaro; five miles W. of Modena.

RUBIFYING, formed of *rubens*, *ruddy*, and *ſio*, *I becom*, in *Chemistry*, &c. the act of turning a thing red by force of fire, &c.

Red arſenic is common white arſenic rubified by a mixture of ſulphur and copper.

RUBIGALIA, or ROBIGALIA, in *Antiquity*, a feaſt celebrated by the Romans, in honour of the god Rubigus, or the goddeſs Rubigo; to engage thoſe deities to preferve the corn from blaſting and mildews.

The Rubigalia were inſtituted by Numa in the eleventh year of his reign; and were held on the ſeventh of the calends of May, which is our twenty-fifth of April; being about the time when the blight or mildew, called by the Latins *rubigo*, uſes to attack the corn.

Varro fixes it to the time when the ſun enters the 16th degree of Taurus. Indeed the true time ſeems rather to have been on the 18th day before the equinox, and the true reaſon, becauſe then Canicula, or the Little Dog, ſets; which is eſteemed a malific conſtellation.

Hence they ſacrificed a dog to Rubigo: Ovid ſays, the entrails of a dog, and thoſe of a ſheep; Columella, only a ſucking puppy. Feſtus inſinuates, that the victim muſt alſo be red.

RUBIGO, or ROBIGO, a diſeaſe incident to corn, particularly called *mildew*.

The rubigo is a ſpecies of blight. See BLIGHT, and RUST of corn.

RUBIN of *Antimony*, in *Chemistry*, a kind of liver of antimony, made with equal parts of nitre and crude antimony detonated together, to which is afterwards added an equal quantity of common ſalt. It is alſo called *magneſia ſpalina*.

RUBIN, or *Roboan*, in *Geography*, a ſmall iſland near the coaſt of Arabia, at the entrance of the ſtraits of Babel-mandeb, near a projecting cape of the continent, and acceſſible by fording at low-water. Pilots are obtained here to navigate veſſels through the ſtraits, and to different ports in the Red ſea.

RUBINELLI, GIOVANNI, in *Biography*, an Italian opera ſinger of the firſt claſs for voice, figure, action, and knowledge, arrived in England, from Florence, in April, 1786. His journey hither from Rome, where he ſung during the carnival of this year, was not very propitious, as the weather was uncommonly inclement; and he was not only overturned in his chair at Macon, in France, but after quitting the ſhip, in which he failed from Calais to Dover, the boat that was to have landed him was overſet near the ſhore, and he remained a conſiderable time up to his chin in water, to the great riſk of his health, his voice, and even his life. The firſt time we meet with his name in the dramatis perſonæ of an opera is in “*Caliroe*,” ſet by Sacchini, for Stuttgart, in 1770, where he performed the part of ſecond man. He ſeems to have continued at the court of Wirtemberg, in no higher ſtation, ſeveral years, as Graſſi and Muzio are named before him in the “*Indice de' Spettacoli Theatrale*.” His name does not appear as firſt ſerious man in Italy till 1774, when he ſung at Modena, in Paſciello's “*Aleſſandro nell' Indie*,” and Anſoſſi's “*Demofonte*.” After this, he appeared as principal ſinger in all the great theatres of Italy, till his arrival in London. The firſt opera in which Rubinelli appeared in England was a *pasticcio*, called “*Virginia*,” May the 4th. His own part, however, was chiefly compoſed by Angiolo Tarchi, a young Neapolitan, then advancing into eminence with great rapidity. Rubinelli is in figure tall and majestic, in countenance mild and benign. There is dignity in his appearance on the ſtage; and the inſtant the tone of his voice is heard, there remains no doubt with the audience of his being the firſt ſinger. It is a true and full contralto from C, in the middle of the ſcale, to the octave above. He ſometimes, however, goes down to G, and up to F; but neither the extra low notes nor the high are very full. All above C is falſet, and ſo much more feeble and of a different register from the reſt, that we were uneaſy when he tranſcended the compaſs of his natural and real voice. His ſhake is not ſufficiently open; but in other reſpects he is an admirable ſinger. His ſtyle is grand, and truly dramatic. His execution is neat and diſtinct. His taſte and embellishments are new, ſelect, and maſterly. His articulation is ſo pure and well accented, in his recitatives, that no one who underſtands the Italian language can ever want to look at the book of the words, while he is ſinging. His cheſt is ſo ſtrong, and his intonation ſo perfect, that we have very ſeldom heard him ſing out of tune. His voice is more clear and certain in a theatre, where it has room to expand, than in a room. He had a greater variety of embellishments than any ſinger we had heard, except Pacchierotti, who not only ſurpaſſes him in richneſs of invention and fancy, but in the native pathos, and touching expreſſion of his voice. Yet Rubinelli, from the fulneſs of his voice, and greater ſimplicity of ſtyle, pleaſes a more conſiderable number of his hearers than Pacchierotti, though none perhaps, ſo exquiſitely, as that ſinger uſed to pleaſe his real admirers. Rubinelli finding himſelf cenſured on his firſt arrival in England for changing and embellishing his airs, ſung “*Return, O God of Hoſts*,” at Weſtminſter Abbey, in ſo plain and unadorned a manner, that thoſe who venerate Handel the moſt, thought him bald and inſipid. Indeed,

we passed several appoggiaturas, which we remember Mrs. Cibber to have introduced, who learned to sing the air from the composer himself; and who, though her voice was a thread, and her knowledge of music very inconsiderable, yet from her intelligence of the words and native feeling, she sung this admirable supplication in a more touching manner, than the finest opera singer we ever heard attempt it; and Monticelli, Guadagni, Guarducci, and Paechierotti, were of the number.

He remained here only one season; for in 1787 we find him singing at Brescia and Venice; and in 1788 he likewise performed in that city; in 1789, at Rome and at Milan; in 1790, at Genoa. He was succeeded in England by Marchesi.

RUBINUS VERUS, from *ruber*, a true carbuncle.

RUBIO, CAPE, in *Geography*, a cape on the N.W. coast of the island of Iviça. N. lat. 39° 5'. E. long. 1° 21'.

RUBIS, in *Ornithology*, guainumbi or humming-bird. See *TROCHILUS Colubris*.

RUBLACEDA, in *Geography*, a town of Spain, in Old Castile; 18 miles S. of Frias.

RUBLE, in *Commerce*, a money of account in Russia, containing 100 copecks, or kopecks. The ruble is also divided into 10 grievens, 33½ altins, or 50 groschen; and the copeck is likewise divided into 2 denushkas, or 4 polushkas.

The gold coins are the imperial and half imperial, of 10 and 5 rubles; double and single ducats, formerly worth 4½ rubles and 2¾ rubles, but raised in value, in 1764, the double ducat to 5 rubles 60 copecks, and the single to 2 rubles 80 copecks. The silver coins are rubles of 100 copecks; also poltins of 50 copecks; polpoltins of 25 copecks; double and single grieven of 20 and 10 copecks; and pieces of 5 altins or 15 copecks; and peyte-copecks, of 5 copecks each, now out of circulation.

Affay and Value of Rubles.

	Affay.		Weight.		Contents in	Value in
	oz.	dwt.	dwt.	gr.	pure Silver.	Sterling.
Ruble of the reign of Peter the Great	W.	2 7	18	1	315.7	3 8
Ruble of Catherine I. (1725)	W.	2 4½	17	11	309.9	3 7¼
Ruble of Peter II. (1727)	W.	2 12	18	5¾	310.2	3 7½
Ruble of the empress Ann (1734)	W.	1 11	16	14½	317.2	3 8¼
Ruble of the empress Elizabeth (1750)	W.	1 7	16	12	321.8	3 9
Ruble of Peter III. (1762)	W.	2 2	15	10	277.8	3 2¾
Ruble of Catherine II. (1780)	W.	2 4	15	12	275.9	3 2½
Ruble of the emperor Paul (1799)	W.	0 14	13	12	280.8	3 3¼
Ruble of Alexander (1802)	W.	0 13	13	1½	273	3 2
Ruble of Alexander (1805)	W.	0 16	13	12	278.6	3 3
Poltin, or half ruble, of the empress Ann	W.	1 10	7	21	151.2	1 9
Poltin of the empress Elizabeth	W.	1 8	8	2	156.9	1 10
Poltin of Catherine II.	W.	2 4	7	1	137.9	1 7¼
Poltin of Paul	W.	0 15	18		139.8	1 7½
Poltin of Alexander (1804)	W.	0 14	13½		136.5	1 7
Polpoltin, or quarter ruble, old	W.	2 6	4	1	71.2	0 10
Polpoltin of Paul	W.	0 11	3	7	67.3	0 9½
Polpoltin of Alexander (1802)	W.	0 13½	3	9½	70.8	0 10
20-copeck piece (1767)	W.	2 2	3	10¾	62.6	0 8¾
20-copeck piece (1784)	W.	2 2	3	3	56.2	0 8
15-copeck piece (1778)	W.	2 2	2	6	40.5	0 5½
10-copeck piece	W.	2 6	2	1	35.8	0 4¾
10-copeck piece (1798)	W.	0 14½	1	9	28.5	0 4
10-copeck piece (1802)	W.	0 13	1	8½	28.3	0 4
5-copeck piece (1801)	W.	0 13½	0	16½	14.3	0 2

Gold Coins.—The ruble, and also the double and half ruble, bear the same impressions as the ducat, viz. the head of the reigning emperor or empress, with the name and titles in Russian characters, thus translated: "Peter by the grace of God emperor, or Elizabeth by the grace of God empress, and sovereign of all the Russias;" but on the reverse of the ruble the value is written, "New coin, 2 rubles or 1 ruble;" and the half piece bears on its reverse the cypher of the empress Elizabeth, with the word "Pol-tina," which means half a ruble. These coins, as well as the ducats, are now nearly out of circulation.

The imperial has the head of the reigning sovereign, with name and title as above; reverse, a cross formed by five escutcheons, with the four figures of the year of coinage in the four angles; legend, "Imperial Russian coin, value 10 rubles;" and on the half imperial, "Value 5 rubles."

But the half imperials of Paul I. have on one side a square, with ornaments, containing the inscription, "Not unto us, not unto us, but unto thy name;" reverse, a cross and four crowns, with a capital I in the centre, and the figure 5 in the four angles of the cross.

Silver Coins.—The ruble has the head of the reigning sovereign, with the name and title as on the gold coins; reverse, a two-headed eagle crowned, with an escutcheon on its breast; legend, "New coin, value 1 ruble," or simply "Coin 1 ruble," and the date. Some rubles of Peter I. and Catherine I. bear on the reverse a cross and four crowns, with four I's, or four double II's in the four angles, and the date within the cross.

The ruble of Paul I. (1799, &c.) bears the same impressions as the half imperial of the same period, except that the legend on the reverse is "Coin, value 1 ruble."

The rouble of Alexander (1802) bears on one side the eagle and legend, as above; on the reverse, "Coin of the Russian empire, rouble," encircled with a branch of laurel, and one of oak, having a small crown at the top.

The poltina, or half rouble, bears the same impressions as the rouble, according to the period at which it was coined, except that the inscription contains the word *POLTINA*, instead of *RUBLE*; and the quarter rouble is marked *POLUPOLTINICK*.

The 20-copeck piece has the head, name, and title of the reigning sovereign, as above; reverse, a two-headed eagle, with the number 20 on its breast, and no legend. The 15-copeck piece bears the same impressions, but it is marked 15.

The 10-copeck piece has the two-headed eagle; reverse, the value of the piece, 10 *COPECKS*.

The 5-copeck piece has a Russian P, with a crown over it, and under which is an I; reverse, 5 *COPECKS*, and two laurel branches. Kelly's Universal Cambist.

RUBRIC, *RUBRICA*, in the *Canon Law*, denotes a title, or article, in certain ancient law-books; thus called, because written, as the titles of the chapters in our ancient Bibles are, in red letters.

RUBRICS also denote the rules and directions given in the Liturgy; for the order and manner in which the several parts of the office are to be performed.

They are called *rubrics* from the Latin *ruber*, red; because formerly printed in red ink, to distinguish them from the rest of the office, which was in black; as they still are in the Roman missals, &c.

The great rubric for the celebration of Easter, prescribed by the Nicene council, is to this purpose: Easter-day to be the Sunday which falls upon, or next after, the first full moon which immediately succeeds the vernal equinox. Dr. Wallis has a particular discourse on the ancient rubrics for the feast of Easter, in the *Philosophical Transactions*.

RUBRICA. See *REDDLE*.

RUBUS, in *Botany*, an ancient Latin word, certainly of the same origin as *ruber*, which appears to be the Celtic *rub*, red. (See *RHUS*, *ROSA*, and *RUBIA*.) The red hue, more or less prevalent, in various parts of the different kinds of Bramble, of which the present genus consists, readily accounts for the application of the above name.—Linn. Gen. 254. Schreb. 342. Willd. Sp. Pl. v. 2. 1080. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 541. Prodr. Fl. Græc. Sibth. v. 1. 349. Ait. Hort. Kew. v. 3. 267. Pursh 346. Juss. 338. Tourn. t. 385. Lamarck Illustr. t. 441. Gært. t. 73.—Class and order, *Icosandria Polygynia*. Nat. Ord. *Senticosæ*, Linn. *Rosaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, flattish, in five oblong, spreading, simple, permanent segments. *Cor.* Petals five, roundish or oblong, somewhat spreading, inserted into the calyx, and usually about the length of its segments. *Stam.* Filaments numerous, shorter than the corolla, inserted into the calyx; anthers roundish, compressed. *Pist.* Germes numerous, altogether superior; styles small, capillary, one springing from the side of each germen; stigmas simple, permanent. *Peric.* Berry compound, consisting of several roundish pulpy grains, each of one cell, collected into a convex head, hollow underneath, inserted upon a conical spongy permanent receptacle, and at length deciduous. *Seeds* solitary, oblong, compressed.

Obi. The separate juicy grains, which compose the general berry, are usually so attached to each other, that they cannot be disunited without tearing. In *R. saxatilis* they are distinct. *R. Chamæmoris* is not, as Linnæus first thought, dioecious, but monoecious; Dr. Solander having

observed that the male and female flowers grow from one root, though on separate stems. Each flower of this species has indeed both stamens and pistils, though, in one or other flower, one part is imperfect.

Eff. Ch. Calyx in five simple segments. Petals five. Berry superior, composed of single-seeded grains, deciduous. Receptacle permanent.

This numerous genus partakes considerably of the beauty and elegance prevalent throughout the whole order of *Rosaceæ*, and is besides valuable, in many instances, for its wholesome and highly grateful fruit. The stem is most generally shrubby; sometimes herbaceous; more frequently trailing than erect; in some of the shrubby kinds biennial only, not perennial. Both stem, stalks, and even the ribs of the leaflets, in many of the shrubby species, are prickly. Leaves either lobed, digitate, pedate, or pinnate. Flowers either solitary, racemose, or paniced, red or white. Fruit black, blueish, red, or yellowish, often highly fragrant. Most of the species grow in cool climates, or mountainous situations. We have several to add to Willdenow's, which amount to 31 in number.

Section 1. *Stem woody*.

1. *R. rosæfolius*. Rose-leaved Bramble.—Leaves pinnate, of five, or three, doubly ferrated leaflets; green, and slightly downy, on both sides. Stem and footstalks prickly. Flowers solitary.—Sm. Plant. Ic. fasc. 3. t. 60. Willd. n. 1. Gathered by Commerfon in the isle of Mauritius, and communicated by Thouin to the younger Linnæus. We have also a fine specimen from sir Joseph Banks, without any account of its native country. The stem is shrubby, round, finely downy like the whole of the herbage, but no part is hoary or white. Prickles somewhat hooked, yellowish, rather small, copiously scattered over the stem and leaf-stalks. Leaflets usually five, ovato-lanceolate, taper-pointed, deeply, sharply, and doubly ferrated; besprinkled with minute resinous particles, and of the same colour, on both sides. Stipulas in pairs on the base of each footstalk, linear-lanceolate, narrow and acute. Flowers solitary, stalked, either axillary, or opposite to the leaves, one of them terminal. Segments of the calyx ovate, taper-pointed, longer than the petals, densely downy, especially on the inner side. We know nothing of the fruit. The minute globular resinous particles, scattered, more or less copiously, over both sides of the leaves, seem peculiar to this species.

2. *R. fraxinifolius*. Ash-leaved Indian Bramble. Poiret in Lamarck Dict. v. 6. 242. (*R. moluccæ parvifolius*; Rumph. Amboin. v. 5. 88. t. 47. f. 1.)—Leaves pinnate, of seven, or five, doubly ferrated, parallel-veined leaflets; quite smooth on both sides. Footstalks prickly. Panicles terminal, smooth, widely spreading.—Gathered by Commerfon in Java. If we are right in the synonym of Rumphius, about which there seems little doubt, and which is certainly misapplied by Linnæus to his *R. parvifolius*, this species is common in Amboyna, growing in low situations near rivers. He says the fruit is red, but watery and insipid. The whole plant in our specimen is, except the downy inside of the calyx, quite smooth, and of so striking an appearance with its large ash-like leaves, marked with numerous, straight, parallel veins, that we cannot but wonder at its having so generally escaped the notice of Indian botanists. The stem is round, slightly, or not at all, prickly; though the footstalks, and now and then the rib of a leaflet, bear small hooked prickles. Stipulas almost fetaceous. Panicles terminal, many-flowered, repeatedly compound, widely spreading; their stalks slender, unarmed, with several, scattered, oblong, smooth bracteas, toothed at the end. Segments of the calyx broadly ovate, with a long slender

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slender point; partly downy on the outside, and densely so within. *Petals* not observed. *Fruit* of very numerous small grains. *Seeds* curiously reticulated or corrugated. Rumphius's figure is about half the size of nature.

3. *R. pinnatus*. Wing-leaved Cape Bramble. Willd. n. 2. Ait. n. 10.—“Leaves pinnate, of five or three rugose leaflets; smooth on both sides. Stem, footstalks, and flower-stalks prickly. Cluster terminal.”—Native country unknown. Willd. Cape of Good Hope, and island of St. Helena; from whence it was introduced by sir Joseph Banks in 1789. Aiton. A shrubby green-house plant, flowering in June and July. *Branched* villous, green, with hooked prickles. *Leaflets* ovato-lanceolate, green, sharply and doubly serrated; their mid-ribs, like the *footstalk*, prickly beneath. *Cluster* simple. *Flower-stalks* villous, very prickly. *Calyx* villous, longer than the *petals*. Willd. We presume the above authors both mean the same plant, though Willdenow is not cited by Aiton, and we have no specimens from either. We should suspect that the above-mentioned specimen of *rosafolius*, communicated by sir Joseph Banks, might be Mr. Aiton's *pinnatus*, were not the latter, as well as Willdenow's, said to have smooth leaves.

4. *R. australis*. New Zealand Bramble. Forst. Prodr. 40. Willd. n. 3.—“Shrubby. Flowers dioecious. Leaves pinnate, of five, or three, leaflets. Stem and footstalks prickly. Clusters simple, axillary.”—Native of New Zealand. Forster.

5. *R. rigidus*. Rigid Cape Bramble.—Leaves pinnate, of five, or three, partial-stalked leaflets; smooth above; very downy beneath. Stem downy, minutely prickly. Cluster terminal, twice compound.—Native of the Cape of Good Hope. We know it only by an unnamed specimen, from thence, in the Linnæan herbarium. The *stem*, *footstalks*, *flower-stalks*, *calyx*, and under side of the *leaves*, are all very densely clothed with fine, short, velvet-like down. *Leaflets* usually five, ovate, doubly and unequally serrated near an inch and a half long, each on a short, thick, partial stalk; the upper side green, smooth, striated with sunk ribs and veins, which project on the downy under side. *Stipulas* lanceolate, downy. *Flowers* numerous, rather small. *Calyx* with short thick points. The *petals* seem to be awl-shaped, and very small. We are unacquainted with the *fruit*.

6. *R. lasiocarpus*. Woolly-berried Bramble.—Leaves pinnate, of seven, or five, leaflets; smooth above; white and very downy beneath. Stem nearly smooth, with curved prickles. Cluster terminal, simple. Fruit downy.—Native of Mysore and the neighbouring hills. Sent by the Rev. Dr. Rottler, under the name of *Rubus indicus*. It appears to be no where described. At first sight the plant resembles our Raspberry, but the *leaflets* are generally seven, the odd one large, often three-lobed; their upper surface strongly striated with veins, which are occasionally hairy; the under very white and woolly, with yellowish, hairy ribs and veins. *Stipulas* awl-shaped, hairy. *Prickles* of the stem numerous, strong, a little curved. *Cluster* of few *flowers*, downy and prickly. *Fruit* clothed with dense, white, woolly down. *Seeds* reticulated. Possibly *R. apetalus* of Poiret, Lamarck Dict. v. 6. 242, may be allied to this.

7. *R. idæus*. Raspberry. Linn. Sp. Pl. 706. Willd. n. 4. Ait. n. 1. Pursh n. 1. Fl. Brit. n. 1. Engl. Bot. t. 2442. Woodv. Med. Bot. t. 138. Fl. Dan. t. 788. Ger. Em. 1272. Math. Valgr. v. 2. 357.—Leaves pinnate, of five, or three, ovate, rather angular leaflets, very downy beneath. Footstalks channelled. Stem with bristly prickles. Clusters terminal, lax, somewhat compound. Native of mountainous or stony woods and

thickets throughout Europe. Mr. Pursh says it occurs also in hedge-rows, from Canada to Pennsylvania; and Dr. Buchanan gathered what we cannot consider as a distinct species, in the woods of Nepaul. It flowers every where in April, May, or June, ripening fruit about six weeks after. The *stems* are erect, shrubby, though only biennial, with creeping perennial *roots*. They are pale brown, usually rough with small bristles rather than thorns; sometimes they are quite smooth. Lower *leaves* pinnate, with two pair of leaflets and an odd one; upper ternate only; leaflets broad-ovate, partly rhomboid, unequally and sharply serrated and cut, more or less pointed; greyish-green, and nearly smooth, above; white with dense cottony down beneath, like the *calyx* and *flower-stalks*. *Footstalks* rather downy, with a strong furrow along their upper side, prickly, like the *flower-stalks*. *Stipulas* setaceous. *Clusters* terminal, for the most part simple, lax, rather drooping. *Flowers* pendulous. *Calyx* with taper points, variable in length. *Petals* erect, obovate, white, small. *Fruit* crimson, of numerous pulpy grains, beset with the permanent styles. Its rich sweetness, and highly perfumed flavour, render this fruit generally agreeable, both recent and preserved. Raspberry jam is an acceptable present, even in India. There are several cultivated varieties, differing in size and luxuriance, as well as the colour of the berries, which are sometimes of an amber hue. Mr. Pursh says there are a number of wild varieties in America; a circumstance which we have not much remarked in Europe. There is usually a second crop of the fruit in gardens. The flavour of the wild kind is thought superior to the cultivated; at least in Wales.

8. *R. subereæus*. Red-fruited Bramble. Engl. Bot. t. 2572. Ait. Epit. Hort. Kew. 373. (*R. nessenis*; Hall in Tr. of R. Soc. Edinb. v. 3. 20.)—Leaves pinnate, of seven, five, or three ovate leaflets; hairy beneath. Footstalks channelled. Stems ascending. Prickles minute, nearly straight. Flowers axillary and terminal, somewhat panicled.—This species, first observed in Scotland near Loch Ness, has since been found in other parts of that kingdom by Mr. George Anderson, F.L.S. as well as in Wales and Yorkshire. It is often intermixed with *corylifolius*, hereafter described, which it resembles in habit, especially in the pubescence, size, and hue of the foliage, though more naturally allied to *R. idæus*. The *stems* are biennial, not quite upright, brittle, reddish, nearly round, with spreading branches. *Prickles* scattered, small. *Leaves* light green on both sides; smooth above. *Panicles* racemose, rather lax, terminal and axillary. *Petals* larger and more spreading than in the last. *Calyx* finally reflexed. *Fruit* deep red, agreeable in flavour, later than the Raspberry, and perhaps for that reason, as Mr. Anderson suggests, not unworthy of cultivation.

9. *R. biflorus*. Two-flowered Bramble. Buch. MSS.—Leaves pinnate, of five or three acute jagged leaflets; hairy above; white and downy beneath: the odd one three-lobed. Stem and footstalks prickly. Flower-stalks downy, terminal, in pairs, single-flowered.—Native of wet situations, about banks of rivers in Upper Nepaul. Gathered by Dr. Buchanan at Chitlong, April 13, 1802. The *stems* are partly procumbent, branched, angular, a little zigzag, armed with scattered, straight prickles. *Leaves* on long, hairy, prickly stalks; their leaflets deeply serrated and jagged, usually five, the terminal one nearly sessile, more or less distinctly three-lobed, or even pinnatifid, though sometimes confluent with the two next, so as to make with them one deeply three-cleft leaflet; they are all very hairy, though green above; snow-white, with greenish hairy veins,

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beneath. *Stipulas* linear. *Flowers* in pairs at the end of each branch, drooping. Segments of the *calyx* broad-ovate, very downy, with short naked tips. *Petals* broad and roundish, as long as the calyx. Of the *fruit* we are ignorant.

10. *R. strigosus*. Rough-stalked American Bramble. Michaux Boreali-Amer. v. 1. 297. Pursh n. 3. (*R. pennsylvanicus*; Lamarck Dict. v. 6. 246.)—"Leaves pinnate, of five, or three, oval, pointed leaflets; downy and white beneath. Stem erect, very bristly, without thorns. Flowers axillary, solitary; their stalks and calyx hispid."—Native of the mountains from Canada to Virginia, flowering in June and July; berries very agreeably flavoured. *Pursh*. The *branches*, *stalks*, and ribs of the *leaves*, *flower-stalks* and *calyx*, are all very hispid, but not prickly. *Michaux*.

11. *R. Commerstonii*. Commersonian Bramble. Poiret in Lamarck Dict. v. 6. 240.—"Leaves pinnate, of seven, or five, leaflets, smooth on both sides. Stem prickly. Flowers terminal or axillary, nearly solitary. Calyx with long points."—Found by Commerston in shady mountainous parts of the island of Java. Poiret says it has some relationship to *R. idæus*, but the *leaflets* are smaller, smooth on both sides, and the *flowers* larger. *Prickles* nearly straight, scattered. *Leaflets* narrow, cut and ferrated; the odd one sometimes lobed. *Footstalks* cylindrical, prickly. *Petals* white, roundish, scarcely longer than the calyx. *Fruit* reddish, the size of raspberries, but with a much less agreeable taste and smell. We have seen no specimen.

12. *R. occidentalis*. Virginian Raspberry. Linn. Sp. Pl. 706. Willd. n. 5. Ait. n. 2. Pursh n. 6. (*R. idæus*, fructu nigro, virginianus; Dill. Elth. 327. t. 247.)—Leaves ternate, taper-pointed, doubly ferrated; downy and white beneath. *Footstalks* nearly cylindrical; prickly and glaucous, like the stem. *Prickles* hooked. Clusters terminal, very prickly.—Native of rocky mountainous situations, from Canada to Carolina, flowering in May and June. Cultivated in Chelsea garden, before the year 1696, according to Plukenet. The *stem* is round, conspicuous for its peculiarly fine glaucous bloom, even in a dried state. *Leaves* all ternate, the side leaflets often furnished with a lateral notch, or lobe. *Prickles* on the *flower-stalks* remarkably numerous, and hooked. *Petals* small; white, commonly emarginate. *Fruit* black, sometimes red, sweetish, but not highly flavoured. *Seeds* wrinkled.

13. *R. triphyllus*. Three-leaved Japanese Bramble. Thunb. Jap. 215. Willd. n. 6.—Leaves ternate, rounded, cut and coarsely ferrated; entire at the base; downy and white beneath. *Branches*, *footstalks*, and *flower-stalks* hairy and prickly. *Flowers* somewhat racemose.—Gathered by Thunberg in Japan. *Stem* round, smooth, purplish, with slender, spreading, wavy *branches*, which are hairy and minutely prickly. *Leaflets* rounded, broad and abrupt, nearly smooth above, of a thin and pliant substance. *Flower-stalks* very shaggy just under the *calyx*, which is downy and white, with long taper points. *Petals* erect, obovate, crenate, with long claws. This species is in reality more akin to our Raspberry than any other, though perhaps sufficiently distinct. We have no knowledge of the fruit.

14. *R. tomentosus*. Velvet-leaved Bramble. Willd. n. 7. Sm. Prodr. Fl. Græc. Sibth. v. 1. 349. (*R. etneus*, trifolius rectus candicans ac pilosus; Cupan. Panphyt. v. 1. t. 149.)—Leaves ternate, or quinate, obovate, unequally ferrated, all over hoary, very soft and downy; paler beneath. *Stem* and *footstalks* with hooked prickles. *Panicle* downy, many-flowered. *Braçteas* linear-lanceolate, sometimes three-cleft.—Native of Germany, Switzerland, the neighbourhood of Constantinople, and the country about

mount Etna. We know no figure of this species, except in the very rare old work of Cupani, where it is extremely well represented, nor does any systematic author but Willdenow describe it. Botanists have most unaccountably confounded it with the common *R. fruticosus*, from which, and every other known species, it is distinguished by the peculiar and uniform soft pubescence of its *leaves*, equalling that of the Marsh Mallow. The *leaflets* vary in shape, but are always contracted towards their base. They are usually three, the lateral ones sometimes lobed at the lower edge. We have a specimen with five distinct leaflets, the lowermost pair smallest, growing out of the partial footstalks of the next. The *stem* is angular, downy, with many uniform, rather small, strongly hooked prickles, such as occur also on the footstalks. *Flowers* large and abundant, with obovate, white, spreading *petals*, twice as long as the *calyx*, whose segments are ovate, finely downy, with small points. The *braçteas* are more pale and membranous than in *fruticosus*. *Stipulas* linear, very narrow, hairy. This species is unknown in England, either wild or cultivated.

15. *R. cuneifolius*. Wedge-leaved American Bramble. Pursh n. 5. (*R. parvifolius*; Walt. Carol. 149.)—"Leaves digitate, of three or five obovate-wedge-shaped leaflets; unequally toothed upwards, plaited, entire at the margin, revolute; downy beneath. *Stem*, *footstalks*, and *flower-stalks* downy, with scattered recurved prickles. Clusters terminal, panicled; the partial flower-stalks divaricated, and almost naked."—In sandy fields and woods, from New Jersey to Carolina, flowering in June and July. A straggling briar, of a grey aspect; the *berries* hard and dry. *Pursh*. Not having seen this plant, we have given, as nearly as possible, a translation of Mr. Pursh's specific character, though we do not quite understand what regards the *leaves*.

16. *R. ellipticus*. Oval-leaved Indian Bramble.—Leaves ternate, elliptical, finely ferrated; downy and hoary beneath: the lower ones simple, somewhat three-lobed. *Stem* and *footstalks* hispid, downy, and prickly. *Panicle* dense, hairy.—Gathered by Dr. Buchanan, in January and April 1802, about the stony banks of rivulets in Nepal. This *shrub* is ten or twelve feet high, with long, climbing, angular, zigzag, leafy *branches*, not only clothed with soft down, and copious rigid prominent bristles, but also bearing scattered, hooked, strong, though not large, prickles. The *footstalks* are similarly furnished. *Leaflets* much resembling those of a common Provins Rose in shape and ferratures, but rather larger, and only three to each leaf; smooth above; their under surface grey or whitish with fine down; the veins parallel, straight, strongly marked. *Stipulas* setaceous. The lower *leaves*, and small axillary ones, are simple, occasionally three-lobed. *Panicle* terminal, dense, shorter than the *leaves*, compound. *Flowers* not very numerous. *Calyx* downy. *Petals* white, longer than the calyx. *Berries* yellow, pleasantly flavoured. *Seeds* wrinkled, numerous.

17. *R. hispidus*. Bristly American Bramble. Linn. Sp. Pl. 706. Willd. n. 8. Ait. n. 3. Pursh n. 7.—Leaves ternate, strongly ferrated, smooth on both sides. *Stems* trailing, round, hispid as well as the *footstalks*. Clusters terminal, slender, somewhat hispid, of few flowers.—Gathered in Canada by Kalm, whose specimen is before us. The *stems* are very long and trailing, clothed with copious, brown, reflexed bristles, without prickles, as are also the *footstalks*. *Leaflets* of a shining green; the middle one obovate; the others dilated, and often lobed at the outer edge; all acute, unequally ferrated. *Flowers* few, with linear,

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linear, sometimes three-cleft, *bractæas*. *Berries* of few grains, with large wrinkled *seeds*. Perhaps this ought to be arranged among the herbaceous species, near *saxatilis* hereafter described.

18. *R. trivialis*. Common American Dewberry. Michaux Boreali-Amer. v. 1. 296. Pursh n. 8.—“Leaves ternate, or quinate, oblong-oval, acute, unequally ferrated, rather downy. Stems trailing. Flower-stalks solitary, elongated, rough, like the footstalks, with recurved prickly bristles. Stipulas awl-shaped. Petals obovate, thrice the length of the calyx.”—Common in old fields, from New England to Carolina, blossoming in May and June. *Flowers* large. *Berries* black, large, very agreeably flavoured, known by the name of Dewberries. *Pursh*.

19. *R. florellaris*. Long Trailing American Bramble. “Willd. Enum. 549.” Pursh n. 9. (*R. trivialis*; Ait. n. 7. *Pursh*.)—Leaves ternate, unequally ferrated, smooth on both sides. Stems trailing, round, beset, like the footstalks, with recurved prickles. Clusters terminal, lax, slender, downy, of few flowers.—Native of fields and sandy woods, from Virginia to Carolina, flowering in June and July. *Pursh*. Very nearly akin to *R. hispidus*, n. 17, but the *leaves* are smaller, and the *stem* is rather prickly than brittle. The hooked prickles on the *footstalks* are few, and widely scattered. *Petals* more orbicular than in the last; whether they accord with those of *hispidus*, we have not materials to determine; but we are greatly inclined to think the present is but a variety of that species.

20. *R. inermis*. Smooth American Bramble. “Willd. Enum. 548.” Pursh n. 10. (“*R. hispidus*; Walt. Carol. 149.”)—“Leaves ternate, ovate, acute, unequally ferrated; downy beneath; the lateral leaflets somewhat cut. Stem, footstalks, and flower-stalks unarmed. Stipulas narrow-awl-shaped.”—Native of Pennsylvania. We have seen no specimen of this species, nor did Mr. Pursh himself meet with it in America.

21. *R. parvifolius*. Small leaved Indian Bramble. Linn. Sp. Pl. 707. Willd. n. 9; excluding the synonym of Rumphius, which has no affinity to this species, but rather belongs to our *fraxinifolius*, n. 2. Leaves ternate, wrinkled, rounded, cut, and crenate; somewhat hairy above; downy and snow-white beneath. Branches and footstalks downy, with short hooked prickles. Stem round. Panicles downy and hairy, of few flowers.—Gathered by Osbeck in China. A miserable specimen from him, without flowers, exists in the Linnæan herbarium; but we have very complete ones collected by Dr. Buchanan, at Chitlong in Nepal, April 10, 1802. Their first appearance accords very much indeed with our Common Raspberry, but the *leaflets* are all ternate, rounded, not pointed, crenate rather than ferrated, as well as more wrinkled; and their upper surface, though green, is clothed with extremely soft hairs, feeling like velvet. The *flowers*, though few together, are panicled rather than simply racemose; their very woolly *calyx* is destitute of long points; and their *stalks* are hairy as well as woolly. We have no account of the *fruit*. The short, but strong and hooked, *prickles* moreover afford an essential distinction between this species and *R. idæus*.

22. *R. sanctus*. Bramble of the Holy Land. Schreb. Dec. 15. t. 8. Willd. n. 10. (*R. creticus* triphyllus, flore parvo; Tourn. Cor. 43. Pococke's Trav. v. 2. pt. 2. 190.)—Leaves ternate, or simple, downy and white beneath. Branches and footstalks downy, with hooked prickles. Stem angular. Panicles downy, many-flowered. Native of Crete and Palestine. This has a general resemblance to our British *R. fruticosus*, but has smaller, more rounded,

and fewer *leaflets*. The *flowers*, and whole plant, are also of smaller dimensions. We do not however profess to be well acquainted with the limits of these two species, nor has the present one been properly investigated.

23. *R. jamaicensis*. Jamaica Bramble. Linn. Mant. 75. Willd. n. 11. Swartz Obf. 205. (R. n. 1; Browne Jam. 242. *R. foliis longioribus*, subtus molli lanugine obductis et incanis, flore et fructu minoribus; Sloane Jam. v. 2. 109. t. 213. f. 1.)—Leaves ternate, or pedato-quinatae, pointed, sharply ferrated; white and finely downy beneath. Branches, footstalks, and flower-stalks downy, with hooked prickles. Panicles lax.—Native of Jamaica; frequent in the mountains of St. Mary's, and those beyond mount *Diable*, towards St. Ann's, but seldom seen in any other part of the island. *Browne*. Sloane justly remarks, that any arguments in favour of the coldness of the air in parts of Jamaica, or Hispaniola, where this bramble occurs, prove nothing, because it is a different species from our European one. Possibly however they may be more nearly related than he was aware. The pubescence of the back of the *leaves*, though very fine, soft, and white, is often approached in those particulars by that of our *fruticosus*, even on the same stem, with leaves that are almost green underneath. The insertion of the stalks of the fourth and fifth *leaflets*, when present, upon those of the next pair, making a pedate leaf, is characteristic of the Jamaica Bramble, but even this is occasionally to be detected in our's. The *flower* and *fruit* are said to be smaller than in *fruticosus*. In the Linnæan specimen the *flowers* are double, quite as large as those of the latter. The ribs of the *leaflets* are prickly in both; nor are the ferratures at all more deep in one than the other.

24. *R. roseus*. Red-flowered Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 245.—Leaves ternate, or simple, smooth. Stipulas oval, obtuse. Flowers axillary, nearly solitary. Calyx smooth, slightly fringed. Stem, flower-stalks, footstalks, and ribs of the leaves very prickly.—Gathered by Dombey in Peru. The *branches*, according to Poiret, are woody, striated, smooth, zigzag, prickly. *Leaves* very large, mostly ternate, oval or lanceolate, unequal, smooth on both sides; a little paler beneath. The terminal *leaflet* is four or five inches long, and three broad. *Stipulas* large, almost half embracing the stem. *Flower-stalks* long, plentifully furnished with strong, reddish, recurved prickles. *Calyx* large, with bluntly-pointed segments, a little fringed at the margin. *Petals* rose-coloured, roundish, shorter than the calyx, furnished with claws. We have seen no specimen, but the above description leaves no doubt of this being a most distinct species.

25. *R. urticifolius*. Nettle-leaved Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 246.—Leaves ternate, or simple, ovate, sharply ferrated; silky beneath. Stem, flower-stalks, footstalks, and ribs of the leaves densely hispid and somewhat prickly. Panicles compound, many-flowered. Calyx silky.—Gathered at Lima by Dombey, from whom we have a specimen. This is said to be of very lofty growth. The *branches* are angular, remarkable, like all the *stalks*, for a dense rusty coating, resembling coarse plush, among which some few short hooked prickles are interspersed. The *leaflets* are large, densely, sharply, and rather unequally ferrated; in form ovate, or somewhat elliptical; their upper side green, minutely downy; the under very densely covered with shining silky pubescence, which is said by Dombey to be of a silvery whiteness when fresh, though rather tawny in our specimen. *Stipulas* almost fetaceous. *Panicle* large, dense, many-flowered. *Bractæas* ovate, silky externally, as well as the *calyx*. *Petals* minute, white.

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white. *Fruit* black, of numerous grains, with reticulated seeds.

Mutis sent Linnæus a specimen from Santa Fé, which agrees in every essential particular with that of Dombey, except the *leaflets* being smaller, and in some instances five in number.—The specific name does not appear to us very appropriate; *holosericeus* would have been better, for we have met with nothing of so silky an aspect in the genus besides.

26. *R. cæsius*. Common Dew-berry. Linn. Sp. Pl. 706. Willd. n. 12. Ait. n. 4. Fl. Brit. n. 2. Engl. Bot. t. 826. Bulliard t. 381. (*R. minor*, fructu cæruleo; Bauh. Hist. v. 2. 59).—Leaves ternate, hairy beneath; the lateral leaflets lobed externally. Stem prickly, prostrate, glaucous. Calyx embracing the fruit.—Native of Europe, in groves and bushy places; not rare in England; about shady hedges and the borders of fields, flowering in June and July, bearing fruit throughout August and September. The stems are round, weak and trailing, beset with slender slightly curved prickles, and conspicuous for a vivid glaucous bloom, easily rubbed off. Though woody, they are only annual, or at most biennial. *Leaflets* three, of a broad, rounded, ovate figure, acute, sharply and doubly serrated, light green; downy and a little paler, but not hoary, beneath; the lateral ones sessile, generally lobed on the outside. *Footstalks* prickly and downy. *Stipulas* lanceolate. *Flowers* few together, in slender, terminal or axillary, prickly panicles. Segments of the *calyx* ovate, or obovate, long-pointed, downy, spreading the *flower*, closed about the *fruit*, which last character is neglected in Bulliard's, otherwise characteristic, plate. *Petals* obovate, longer than the calyx, spreading, waved and crumpled, white, rarely reddish. *Fruit* of few and rather large grains, black with a bright blue tinge, like a plum; its flavour very agreeably acid, though not perfumed, and destitute of the mawkish flavour of the common Black-berry.

27. *R. corylifolius*. Hazel-leaved Bramble. Fl. Brit. n. 3. Engl. Bot. t. 827. Ait. n. 5. (*R. major*, fructu nigro; Schmidel Ic. t. 2. *R. montanus repens*, farmentis longissimis et rotundis, spinis tenuissimis exasperatis, amplo coryli folio, flore albo, fructu nigro crassiore; Mich. Hort. Florent. 82. Till. Pis. 149?)—Leaves quinate, or ternate, rounded, hairy beneath; the lateral leaflets sessile. Prickles straightish. Calyx of the fruit reflexed.—Native of England, Germany, and probably of Italy. We cannot discover that Dr. Sibthorp met with this species in Greece. Dillenius seems to hint at it in his edition of Ray's *Synopsis*, 467, as differing from the common bramble, in having "earlier, larger, and white blossoms," which is correctly true. Mr. Crowe, ever attentive to the useful parts of botany, was led to distinguish our *corylifolius*, by observing that thatchers rejected the *stems*, on account of brittleness, and selected the true *fruticosus* to bind down their thatch, that species being truly shrubby and perennial; while the *stems* of the present are, like those of the Raspberry, biennial, and far more brittle than *fruticosus*. They are moreover roundish, all the prickles nearly straight, not hooked. The *leaflets* are large, pliant, doubly serrated, always of a bright green on both sides; hairy, but never white or cottony, beneath. Some of them so exactly resemble the leaves of a hazel, that we have puzzled good botanists to distinguish one from the other. The *flowers* appear early in July, and are white, forming an oblong cylindrical *panicle*. *Fruit* earlier, of a browner black, of rather fewer grains, and more gratefully acid than in *fruticosus*, being intermediate, as it were, between the Dew-berry and Common Black-berry. Its

reflexed *calyx* distinguishes it readily from the former. Our *corylifolius* is supposed to be the *fruticosus* of Hoffmann's German Flora, and perhaps of many other botanists. Willdenow has it not.

28. *R. fruticosus*. Common Bramble, or Black-berry. Linn. Sp. Pl. 707. Willd. n. 13. Ait. n. 6. Fl. Brit. n. 4. Engl. Bot. t. 715. Mill. Illustr. t. 45. (*R. major*, fructu nigro; Bauh. Hist. v. 2. 57. *Rubus*; Ger. Em. 1272. Camer. Epit. 751.)—Leaves mostly quinate, downy beneath; leaflets stalked. Stem angular, beset, like the footstalks and flower-stalks, with hooked prickles. Calyx of the fruit reflexed.—Common in hedges and thickets throughout Europe; flowering with us in July and August, and ripening fruit in September and October. Dr. Sibthorp found this species extremely abundant in Greece, and conceived it to be, as generally supposed, the true *Berberis*, or Bramble, of Dioscorides, the same name being given to it by the modern Greeks. The *stem* is truly shrubby and perennial, long and arching, purplish, strongly angular, armed with very powerful hooked prickles, such as occur, of a smaller size, on the stalks and ribs of the *leaves*, as well as on the *flower-stalks*. The *leaflets*, usually five, are of a narrower, more oblong, and pointed form than the last; dark green above; very white and cottony beneath; though specimens may occasionally be found which have, on one and the same branch, such white-backed leaves, with others that are pale green, or barely hoary. All the *leaflets* have commonly very considerable partial footstalks, the outermost more or less combined with the next. The *flowers* in long, cylindrical, compound, dense, and rigid panicles, are of an elegant blush or rose-colour, seldom white. *Calyx* downy, moderately pointed, always reflexed both in flower and fruit. *Berry* of very numerous crowded grains, of a violet black when ripe, with a sweet but mawkish taste, acceptable only to children, whose

"Pretty lips with black-berries,
Are oft besmeared and dyed."

There is a supposed variety of *R. fruticosus* with jagged *leaves*, green beneath, and double white *flowers*.

29. *R. villosus*. Hairy American Black-berry. Ait. n. 8. Willd. n. 14. Pursh n. 2.—Leaves quinate, or ternate, ovate-oblong, taper-pointed, sharply serrated, finely hairy on both sides. Stem and footstalks hispid, and somewhat prickly. Clusters simple, lax, hairy, and glandular; sometimes leafy.—In old fields and commons, from New England to Carolina, frequent, flowering in June and July, and known by the name of Black-berries. *Pursh*. It appears to have been introduced into the gardens of England and France about the same time, near 40 years ago. In the latter it was called *R. vulpinus*. The *leaves* are rather large, properly consisting of five leaflets, green on both sides, of which the terminal one has a very long partial stalk, and the two hindmost very short ones, all the partial stalks radiating from one point. In some of the upper leaves the lateral leaflets are combined for almost their whole length; the next leaf to these is ternate; and the uppermost of all simple, diminishing into a leafy *bractea* under each *flower-stalk*, but still accompanied by *stipulas*. The *flowers* are rather small, and seem to be white.

30. *R. canadensis*. Purple-stalked Canada Bramble. Linn. Sp. Pl. 707. Willd. n. 15. Pursh n. 4.—Leaves digitate, of from ten to five, or three, lanceolate, taper-pointed, sharply serrated, partial-stalked leaflets, smooth on both sides. Stem without prickles.—In rocky barren woods of Canada and New England, flowering in June and July.

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The stem and old branches are purple. *Pursh.* This is very unlike all the rest, having so many leaflets, all smooth on both sides; paler beneath, where they are marked by strong, prominent, parallel veins. *Footstalks* channelled, purplish, nearly or quite smooth. *Stipulas* setaceous. *Flowers* in simple, dense, terminal, downy clusters, with ovate, pointed, smooth bracteas. *Calyx* of the fruit reflexed, slightly downy. *Berries* of a few large grains, with wrinkled seeds. Linnæus by mistake cites the very same figure of Miller, which a few lines below, he properly refers to *R. odoratus*. This error Willdenow implicitly copies, without doubt or remark.

31. *R. spectabilis.* Elegant American Bramble. *Pursh* n. 11. t. 16.—Leaves ternate, ovate, acute, doubly serrated; downy beneath. Stem smooth and unarmed. Stalks single-flowered, solitary. Petals ovate.—Gathered by Mr. Menzies on the north-west coast of America, and by governor Lewis on the banks of the Columbia; flowering in April and May. *Pursh.* An elegant shrub, four or five feet high. Stem smooth, destitute of prickles; the branches slender, round, very smooth. Leaves large, on downy, channelled, occasionally somewhat prickly stalks, ternate; the lateral leaflets sessile, oblique at the base, and lobed at the outer side. *Stipulas* awl-shaped. *Flowers* as large as in the following species, of a full and rich crimson. Segments of the calyx downy, oblong, with short points. *Petals* full twice as long as the calyx.

32. *R. odoratus.* Flowering Raspberry. *Linn. Sp. Pl.* 707. *Willd. n.* 16. *Ait. n.* 9. *Pursh n.* 12. *Curt. Mag. t.* 323. *Mill. Ic. t.* 223. *Cornut. Canad.* 149. t. 150.—Leaves simple, with three or five acute lobes. Stem erect, hispid, unarmed. Corymbs terminal, spreading, hispid and glutinous. Petals nearly orbicular. Calyx with linear leafy points.—This, according to Mr. Pursh, is found in the woods of Canada, and on the Alleghany mountains, from New York to Carolina, blossoming in June and July. In the gardens of Europe it has been cultivated for above a century, being, though a greenhouse plant in Sweden, perfectly hardy with us, and generally admired in shrubberies for the beauty of its copious, large, crimson flowers, with singularly white stamens; as well as for the cedar-like fragrance of its glutinous, rough, brown flower-stalks and calyx. The stems are a yard high, or more, biennial like *R. idæus*. Leaves ample, serrated, roughish, of a fine green. The fruit is scarcely ever formed in England. Miller describes it as reddish, insipid, of numerous small grains. Mr. Pursh says “the berries are yellow, of a very fine flavour and large size, but scarcely ever produced in the gardens.”

33. *R. alceefolius.* Hollyhock-leaved Bramble. *Poiret* in *Lamarck Dict. v.* 6. 247.—Leaves simple, somewhat palmate, sharply serrated, rugose; downy beneath. Clusters axillary and terminal, prickly. Bracteas in many capillary segments. Calyx very hairy, inflated. Branches angular. Gathered by Commerçon in Java. The stems are about as tall as *R. idæus*, divided into very hairy, almost quadrangular, branches, furnished with reddish prickles. Leaves lobed, almost palmate, sharply toothed, very broad; rough and wrinkled, but not hairy, on their upper surface; downy beneath, with yellowish reticulated veins. *Footstalks*, as well as the principal ribs of each leaf, prickly. Clusters short, prickly, very hairy. Bracteas hairy, divided into numerous capillary segments. Calyx inflated, almost globular, divided half way down into five oval segments; white within; clothed externally with dense, tawny, woolly hairs. *Petals* roundish, white, soon falling. We know nothing of this species but from *Poiret's* description, which

is very clear and well marked. We have altered his specific character by that description, for the purpose of contrasting its essential particulars with the following.

34. *R. rugosus.* Rugged-leaved Bramble.—Leaves simple, heart-shaped, roundly lobed, crenate, rugose; downy beneath. Clusters axillary and terminal. Bracteas ovate, cut. Calyx very hairy, branches round, prickly.—Gathered by Dr. Buchanan, July 18, 1802, at Sembu, in Upper Nepal, where it is called, in the Parbuttic language, *Jogi Asybalu*, and by the Nawars *Cumbatasshi*. The stem is climbing, with round, downy branches, armed with small, scattered, hooked prickles. Leaves as broad as the palm of the hand, heart-shaped, acute, with about five or seven rounded, sharply crenate, rather shallow lobes; the upper side green, tessellated with numerous wrinkles, rather hairy; the under white and downy, reticulated with innumerable veins. *Footstalks* round, downy and prickly, as well as the principal ribs. *Stipulas* oblong, ovate, toothed, downy. Clusters short and dense, chiefly axillary, not so long as the footstalks, of few flowers; the terminal one larger. Bracteas broader than the stipulas, hairy, slightly cut or toothed. Flowers large. Calyx densely covered with long silky hairs; its segments ovate, acute, recurved, downy within. Petals white, erect, almost as long as the calyx, ovate, obtuse, finely toothed, furnished with claws. Fruit red. The round branches, less divided leaves, and more entire bracteas, seem to render this essentially distinct from *Poiret's alceefolius*, to which it is evidently next akin.

35. *R. tiliaceus.* Lime-leaved Bramble.—Leaves heart-shaped, rounded, acute, sharply crenate, very obscurely lobed; white and downy beneath. Clusters axillary. Segments of the calyx lanceolate, downy. Stem and footstalks round, downy, slightly prickly. Gathered by Dr. Buchanan at the same place as the last, June 2, 1802. The leaves somewhat resemble those of the American *Tilia alba*. They are sometimes nearly orbicular, but generally have indications of a slight lobe at each side; the upper surface is green, naked, and tolerably even; the under clothed with very soft fine white down. All the stalks, like the calyx, are more cottony than silky. The latter is deeply divided, spreading, or in some degree recurved. Petals small, spatulate. Seeds wrinkled. The clusters are more lax, and the flowers very much smaller than in *R. rugosus*. Small dispersed prickles may be felt, rather than seen, here and there on the downy branches and footstalks. The bracteas are small, woolly, deeply jagged.

36. *R. moluccanus.* Molucca Bramble. *Linn. Sp. Pl.* 707. *Willd.* 17. (*R. moluccus latifolius*; *Rumph. Amboin. v.* 5. 88. t. 47. f. 2.)—Leaves simple, heart-shaped, somewhat lobed, crenate; white and downy beneath. Clusters axillary and terminal, aggregate. Bracteas deeply palmate. Calyx silky. Stem and footstalks round, downy, prickly.—Native of Amboyna and the Molucca islands. Very nearly allied to the three preceding species, but the leaves are more elongated and acute than in any of them, with a pair of rounded, more or less distinct, lateral lobes towards the base. The deeply palmate, or digitate silky bracteas seem nearly to agree with those of the *alceefolius*. The flowers are plentiful. Calyx silky, with deep, lanceolate, taper-pointed segments. Petals obovate, crenate. Fruit red, eatable, but rather insipid.

37. *R. microphyllus.* Small-leaved Japan Bramble. *Linn. Suppl.* 263. (*R. palmatus*; *Thunb. Jap.* 217. *Ki Itzigo*; *Kämpf. Amœn. Exot.* 787.)—Leaves simple, heart-shaped, obtuse, three-lobed, smooth. Stem and footstalks prickly. Flowers solitary. Outside of the calyx naked. Gathered by Thunberg, in hilly places, between Miaco and Quana in Japan,

Japan, flowering in April. The *stem* is shrubby, erect, two or three feet high. *Branches* round, wavy, smooth, purplish, beset with prominent, rather ascending, scattered prickles. *Leaves* several together from each lateral bud, on shortish, channelled, rather prickly *stalks*, heart-shaped, rounded, sharply crenate, more or less three-lobed, strongly veined and somewhat plaited, smooth on both sides; paler beneath; their length about an inch. *Flowers* solitary from each bud, stalked. *Calyx* smooth and angular at the outside; downy within; its segments lanceolate, acute. *Petals* twice as long as the calyx, obovate, white, wrinkled, with long claws. *Fruit* yellow, very well flavoured.

38. *R. incisus*. Cut-leaved Japan Bramble. Thurb. Jap. 217. Willd. n. 19.—*Leaves* simple, heart-shaped, obtuse, cut, smooth. *Footstalks* with hooked prickles. *Stem* prickly. *Flowers* solitary. Outside of the calyx naked.—Native of Japan. We have seen no specimen. This species seems, from Thunberg's description, very near the last, differing chiefly in the divisions of the *leaves*.

We here find in Willdenow the *R. japonicus*, Linn. Mant. 245. Suppl. 263. This the Linnæan herbarium shews to be no other than *Corchorus japonicus* of Thunberg, a beautiful shrub, now becoming common in our gardens, where it is quite hardy. The double yellow *flowers* are much admired. Linnæus, by his specimen, supposed the *petals* to be white. He knew nothing of the *fruit*, and judging by the habit, was not inexcusable in referring the plant to *Rubus*. See CORCHORUS, n. 12.

39. *R. corchorifolius*. Corchorus-leaved Bramble. Linn. Suppl. 263. Willd. n. 21. (*R. villosus*; Thunb. Jap. 218.)—*Leaves* simple, oblong-heart-shaped, pointed, serrated, somewhat hairy. *Stem* round, downy, prickly. *Flowers* solitary. Outside of the calyx hairy. Native of Japan, between Miaco and Jedo, flowering in April. The *stem* is shrubby and upright, finely downy, with a few distant, slightly recurved, prickles. *Footstalks* hairy and prickly. *Leaves* longer, and much more pointed, than in *microphyllus* or *incisus*, with finer more copious serratures; their ribs and veins especially hairy. *Flowers* on the young branches, stalked, solitary, much like the two last species, but the calyx is both downy and hairy on the outside. Nothing is said of the *fruit*. The *leaves* are described by Thunberg as elegantly plaited before they fully expand.

40. *R. elongatus*. Long-clustered Bramble. Sm. Plant. Ic. t. 62. Willd. n. 22.—*Leaves* simple, heart-shaped, pointed, doubly crenate; white and downy beneath. *Panicle* elongated, racemose. Segments of the calyx rounded, obtuse. Gathered by Commerfon in Java. The *branches* are round, downy, with minute dispersed prickles. *Leaves* very smooth and even on the upper side; their margin furnished with a row of broad shallow notches, or serratures, with small, rather acute, intermediate ones. *Panicle* terminal, long, lax, zigzag, finely downy or silky, in every part, as well as the *calyx*. *Braçæas* oblong, jagged at the end, deciduous. *Flower-stalks* short and thick, aggregate, clustered, or somewhat umbellate. Segments of the *calyx* remarkably rounded. *Petals* orbicular, white. *Fruit* red.

41. *R. paniculatus*. Spreading Panicked Bramble.—*Leaves* simple, heart-shaped, pointed, slightly lobed, sharply and finely crenate: white and downy beneath. *Panicle* twice compound, spreading. Segments of the calyx ovate, taper-pointed. Gathered by Dr. Buchanan, at Narain hetty, in Nepal, Nov. 18, 1802. The round, downy *branches*, with small scattered prickles, agree with the last, as well as with *moluccanus*, *rugosus*, &c. The woolly *footstalks* also bear very small hooked prickles. The *leaves* are as broad as the hand, more finely and sharply crenate than those of *R.*

elongatus, with some irregular, shallow, obsolete, acute lobes. *Panicle* very large, lax and spreading, twice, or even thrice compound, downy, its ultimate stalks partly umbellate, but all much more long and slender than in the foregoing. The *calyx* also differs essentially in its tapering segments, downy, not silky on both sides. *Petals* small, obovate. *Fruit* black.

42. *R. pyrifolius*. Pear-leaved Bramble. Sm. Plant. Ic. t. 61. Willd. n. 23.—*Leaves* simple, elliptical, pointed, ferrated, smooth. *Panicle* corymbose, downy. *Calyx* partly jagged. *Petals* minute.—Found in Java, by Commerfon. The *branches* are slender, round, slightly zigzag, minutely hairy, armed with small recurved prickles. *Leaves* on shortish hairy *stalks*, coriaceous, three inches long, and one broad, coarsely ferrated; the ribs and veins only hairy on both sides. *Panicle* terminal, large, twice compound; its branches corymbose and downy. *Braçæas* linear, deeply jagged, deciduous. Segments of the *calyx* ovate, taper-pointed, downy on both sides; the points of two or three of them deeply divided into three or four parts, while the rest are entire. *Petals* very small, abrupt and jagged, scarcely a quarter the length of the calyx. *Fruit* of a few large grains, with wrinkled seeds.

43. *R. acuminatus*. Pointed-leaved Bramble.—*Leaves* simple, ovate, taper-pointed, ferrated, smooth. *Panicle* racemose, not downy. *Petals* as long as the calyx.—Found by Dr. Buchanan, in the woods at Sembu in Upper Nepal, flowering early in July, 1802. This species is related to the last, but very distinct. The *stem* is climbing, unarmed. The *branches* are minutely prickly, but not hairy. *Leaves* four or five inches in length, scarcely coriaceous, smooth and shining on both sides, paler beneath, simply or doubly ferrated, remarkable for their long taper points. *Footstalks* channelled, prickly, as well as the midrib, hardly pubescent. *Stipulas* awl-shaped, toothed, smooth, deciduous. *Panicle* terminal, elongated, zigzag, compound, accompanied by some leaves; its ultimate branches often three-flowered. *Flower-stalks* warty, but not downy. *Braçæas* awl-shaped, simple or divided, smooth. *Calyx* warty and downy, with a short simple point to each segment. *Petals* ovate, acute, the length of the calyx, white. *Fruit* of a very bright red, larger than the calyx.

SECT. 2. *Stem herbaceous*.

44. *R. pedatus*. Pedate Bramble. Sm. Plant. Ic. t. 63. Willd. n. 24. Pursh n. 17.—*Leaves* pedate, of five bluntish, nearly smooth, cut and ferrated leaflets. *Flower-stalks* capillary, simple, bracteated in the middle. *Calyx* smoothish, partly cut, reflexed.—Gathered on the north-west coast of America, by Mr. Menzies, to whom we are obliged for specimens. This is an elegant, delicate, herbaceous plant, with creeping *roots*, throwing up, at intervals, short simple *stems*, with one or two *leaves*, on long, slender, channelled *footstalks*, and one, rarely two, *flower-stalks*, nearly the same length, but more slender, bearing a pair of little roundish *bractæas*, about half way up. *Stipulas* in pairs, roundish, fringed, larger than the *bractæas*. *Flowers* solitary, small. *Calyx* deeply divided; its segments oblong, some of them three-cleft. *Petals* the same length, elliptical, rather abrupt or jagged; whether white or yellow we are doubtful. If the latter, it would greatly confirm Mr. Pursh's suspicion of this plant being a species of *Dalibarda*, provided that genus should be established, a point on which we shall touch at the conclusion of this article. We know nothing of the *fruit* of our *R. pedatus*.

45. *R. saxatilis*. Stone Bramble. Linn. Sp. Pl. 708. Willd. n. 25. Ait. n. 11. Pursh n. 13? Fl. Brit.

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n. 5. Engl. Bot. t. 2233. Fl. Dan. t. 134. Ger. Em. 1273.—Leaves ternate, acute, slightly downy, doubly and unequally notched. Runners creeping, herbaceous. Panicle of few flowers. Stipulas ovate.—Native of stony, rather mountainous, dry woods and thickets, in the north of Europe, chiefly confined with us to Scotland, Wales, and the most northern and hilly part of England, flowering in June. The whole herb is of a slender delicate habit, light green, slightly downy, not at all white or hoary. It spreads extensively by means of long trailing shoots, either naked or leafy, which do not blossom till their extremities have taken root. The flowering *stems* are solitary, erect, simple, a span high, slightly angular, leafy, hairy, besides a few occasional, very tender, horizontal prickles, often present also on the *footstalks*. The *leaflets* are in some measure rhomboid, sharply and coarsely crenate; the side ones now and then lobed at the lower margin, and very rarely two at each side. *Cluster* terminal, downy, of from three to five small inconspicuous *flowers*. Segments of the *calyx* lanceolate, downy, acute. *Petals* erect, lanceolate, bluish, cream-coloured or greenish. *Berries* of a very few large, crimson, globular grains, pleasantly acid. *Seeds* compressed, wrinkled.

Mr. Pursh, following Michaux, considers as a variety of this a plant found in Canada, and on the mountains from New York to Virginia, which has small black *berries*. The *flowers* are about three, on long partial stalks. Its runners accord with our *saxatilis*, but we should presume that an accurate comparison of these two plants might prove them to be distinct species.

46. *R. obovatis*. Moss American Black-berry. Michaux Boreali-Amer. v. 1. 298. Pursh n. 14.—Leaves ternate, oval, rounded, serrated, naked. Stem hispid. Clusters somewhat corymbose, of few flowers. Stipulas fetaceous.—Found in swamps, among bog-moss, on the mountains from New York to Carolina, flowering from May to July. The *stem* is described as rather shrubby, hispid with rigid hairs. *Flower-stalks* elongated. *Bractes* ovate. *Berries* with only a few large grains, black and sweet. The name, and definition of the *leaves*, *foliis obovatis*, are incorrect. An oval is of the same breadth at each end. We presume Michaux meant *obovate*.

47. *R. arcticus*. Dwarf Crimson Bramble. Linn. Sp. Pl. 708. Fl. Lapp. ed. 2. 170. t. 5. f. 2. Willd. n. 26. Ait. n. 13. Pursh n. 15. Fl. Brit. n. 6. Engl. Bot. t. 1585. Curt. Mag. t. 132. Fl. Dan. t. 488.—Leaves ternate, smooth, bluntly serrated. Stem mostly single-flowered, without prickles. Petals roundish, notched.—Native of Lapland, also of Labradore, and about Hudson's Bay; as well as of the isle of Mull, and the mountains of Ben-y-glo, in Scotland, flowering in May and June. The *root* is perennial and creeping, but without scyons. *Stems* unarmed, erect, leafy, from four to eight inches high, almost invariably simple and single-flowered, though sometimes from luxuriance an axillary blossom occurs at the second leaf, as drawn in Engl. Bot. *Leaflets* always three, ovate or rhomboid, bluntish, with broad roundish serratures. *Stipulas* ovate, entire. *Flower* terminal, stalked, of a beautiful crimson. *Calyx* downy, often with six or seven segments, with which the *petals* agree in number. The latter are mostly emarginate, sometimes much jagged. *Berry* of a few large grains, amber-coloured, with a purplish tinge, about as big as a raspberry, but far superior in flavour, partaking of that fruit and the strawberry, with a luscious sweetness. Linnæus justly extols this fruit, and acknowledges his obligation to it, when fatigued with the labours of his Lapland tour. Syrup,

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jelly, and wine are made of it in Sweden, which are esteemed highly. These berries are often ripened in our gardens, provided the plant be allowed to grow with luxuriance. The *seeds* are scarcely perceptibly wrinkled.

48. *R. pifillatus*. Close-styled Bramble. Sm. Exot. Bot. v. 2. 53. t. 86. Ait. n. 12. Pursh n. 16. (*R. acaulis*; Michaux Boreali-Amer. v. 1. 298.)—Leaves ternate, smooth, sharply serrated. Stem single-flowered, without prickles. Petals oblong, entire. Styles clustered together.—Native of Labradore; and, according to Mr. Pursh, of the bogs of Canada, as well as the north-west coast of America, flowering in June and July. It was first cultivated in England by Mr. Dickson, in the garden of the late Rt. Hon. Charles Greville at Paddington, about the year 1802. This most resembles the *arcticus* in habit, but is of more humble stature, though by no means destitute of a stem. The *leaves* are more acutely serrated, and rise above the *flower*, which is crimson, large, and handsome, on a terminal, downy, simple *stalk*. *Calyx* with six, or more, lanceolate, narrow segments, rather downy. *Petals* as numerous, and twice as long, elliptic-oblong, with taper claws. *Stamens* club-shaped and obtuse, which is likewise the case in the *arcticus*, but in the present there is more of a capillary stalk to the *anther*. *Germen* depressed. *Styles* few, crowded together, looking like a simple one. We know nothing of the *fruit*.

49. *R. geoides*. Avens-leaved Bramble. Sm. Plant. Ic. t. 19. Willd. n. 29.—Leaves simple or ternate, obtuse, serrated, smooth; the odd leaflet very large. Stems depressed, single-flowered. Petals roundish.—Gathered by Commerçon at the straits of Magellan. This is a humble depressed herb, with very short *stems*. *Footstalks* long, channelled, slightly hairy, each bearing two awl-shaped *stipulas*, a good way above the base. *Leaves* mostly composed of one large, heart-shaped, rounded, abrupt, unequally serrated, smooth, terminal leaflet, and a pair of, much smaller, stalked ones, which last are sometimes wanting. *Flower* terminal, solitary, on a thick downy stalk. Segments of the *calyx* oblong. *Petals* nearly orbicular. *Fruit* unknown. Commerçon observed the *stamens* and *pisils* to be always present together in each flower, in which this plant differs from *R. Dalibarda* and *Chamæmorus*, hereafter described.

50. *R. trifidus*. Three-cleft Japan Bramble. Thunb. Jap. 217. Willd. n. 27.—Leaves simple, three-cleft, cut and serrated, smooth. Stem without prickles, nearly simple, erect. Flowers stalked, solitary. Calyx white and downy.—Found by Thunberg, near Quana in Japan, flowering in April. The *stem* is said to be rather zigzag, round, mostly simple, purple, and smooth. *Leaves* stalked, heart-shaped, roundish, nearly as broad as the palm of the hand; their lobes cut, and unequally serrated. *Flowers* from the same bud with the leaves, solitary, on a simple, rarely divided, *stalk*, which is like the *footstalks*, about a finger's length, and villous. *Fruit* red, eatable, agreeably flavoured. By the above description, taken from Thunberg, it should seem that there are more *flowers* than one on each stem; but we have seen no specimen.

51. *R. stellatus*. Starry-flowered Bramble. Sm. Plant. Ic. t. 64. Willd. n. 28. Pursh n. 18.—Leaves simple, three-lobed, rugose. Stem single-flowered. Segments of the calyx awl-shaped. Petals lanceolate.—Gathered by Mr. Menzies, near Foggy Harbour, on the north-west coast of America. The *roots* are perennial and creeping. *Stems* annual, solitary, erect, simple, leafy, downy, without prickles, about two inches high. *Leaves* two or three, alternate, on long downy stalks, heart-shaped, broader than they are long,

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more or less deeply three-lobed, rather acute, sharply serrated, rugose, veiny, slightly hairy; paler beneath. *Stipulas* roundish, or ovate, somewhat notched. *Flower* large, terminal, solitary, much overtopped by the foliage, crimson, on a short downy stalk. *Calyx* hairy, with from five to ten long, taper segments; its base angular and ribbed. *Petals* as many, lanceolate or obovate, with taper claws. *Berry* composed of several grains. The *calyx* sometimes remains through the winter, elevated on the elongated dried *stem*, as in the plate above cited.

52. *R. Chamæmorus*. Mountain Bramble, or Cloud-berry. Linn. Sp. Pl. 708. Fl. Lapp. ed. 2. 173. t. 5. f. 1. Willd. n. 30. Ait. n. 14. Pursh n. 19. Fl. Brit. n. 7. Engl. Bot. t. 716. Lightf. Scot. 266. t. 13. f. 2. Fl. Dan. t. 1. (Chamæmorus; Ger. Em. 1273. Vaccinia nubis; ibid. 1420, very bad.)—Leaves simple, lobed, rugose. Stem single-flowered. Segments of the calyx ovate. Petals roundish.—Native of alpine turf bogs in the north of Europe, frequent in Lapland, Denmark, Siberia, &c., as well as on the highest mountains of Scotland, Wales, and the north of England, flowering in June. It occurs also in Canada and New England. The roots are long and creeping, throwing up here and there solitary stems, about a span high, some bearing solitary male flowers, others female ones. Leaves shaped like those of a mallow, or currant, heart-shaped at the base, strongly veined, plaited, smooth, unequally serrated, one or two on each stem. Footstalks slightly hairy. Stipulas ovate, obtuse. Flower on a long downy stalk, rising above the leaves, white, elegant. Calyx tawny, downy, with five broad ovate segments. Petals about twice as long as the calyx. Berry of many large grains, amber-coloured, with a pleasant acid flavour resembling that of tamarinds, though rather mucilaginous. Lightfoot says, these berries are brought to table in the highlands. Linnæus speaks of them as much esteemed by the Laplanders, who preserve them through the winter, buried under the snow.

53. *R. coriaceus*. Coriaceous Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 237.—Leaves simple, ovate-oblong, undivided, smooth, serrated. Stem and footstalks somewhat prickly. Flowers axillary, solitary. Segments of the calyx lanceolate. Petals roundish.—Found by Dombey in Peru. Described by Poiret, from Jussieu's herbarium. The stems are erect, nearly simple, herbaceous, reddish, compressed, very smooth, except a few small scattered prickles on their upper part. Leaves alternate, distinct, thick, and coriaceous, rather obtuse; shining on the upper side; their footstalks furnished with some small prickles. Stipulas oval, toothed. Flowers axillary, towards the top of the stem, on simple, thickish stalks, armed with very fine prickles. Calyx large, broad at the base, with five smooth, lanceolate, pointed, greenish segments. Petals rounded, shorter than the calyx, crenate at the extremity, appearing yellow when dry.

54. *R. Dalibarda*. Violet-leaved Dwarf Bramble. Linn. Sp. Pl. 708. Willd. n. 31. Sm. Plant. Ic. t. 20. Lamarck Illustr. t. 441. f. 3. (Dalibarda repens; Linn. Sp. Pl. ed. 1. 491. Poiret in Lamarck Dict. v. 6. 250. Pursh v. 1. 350. D. violæoides; Michaux Boreali-Amer. v. 1. 299. t. 27. Ait. v. 3. 271.)—Leaves simple, heart-shaped, undivided, crenate, hairy. Stems creeping. Stalks single-flowered. Petals ovate. Gathered by Kalm in Canada. Mr. Pursh says it is found in the shady woods and bogs of that country, and on the high mountains of New England and Pennsylvania, flowering in May and June. The herbage much resembles that of some species of violet. The root is perennial and creeping, sending forth several

depressed, creeping, round, leafy, downy stems. Leaves rounded, about an inch in diameter, finely hairy on both sides, on long, slender, hairy footstalks. Stipulas oblong, with several terminal awl-shaped segments. Flower-stalks nearly radical, about as long as the footstalks, but more slender, simple, hairy, each bearing a small white flower, not unlike a single hepatica, but about half the size. Segments of the calyx lanceolate, acute, downy, sometimes partly notched, nearly equal to the petals. Stamens capillary. Styles five, above half as long as the stamens. They are erroneously described "very short" in the Plant. Ic. Fruit of five, or not so many, pale, dry, ovate, obtuse grains, minutely downy, and slightly wrinkled.

The want of pulp in the fruit first induced Linnæus to separate this plant, as a genus, from *Rubus*; but he afterwards altered his opinion. His original determination has been followed by Michaux, Pursh, and Aiton. The question is difficult, but there are many different degrees of pulpiness in the several fruits of acknowledged *Rubi*, and Mr. Pursh himself describes his *cuneifolius*, see n. 15, with "hard and dry berries," though no person surely would think of placing that species any where else. Till, therefore, we can judge for ourselves, by tracing the growth of the fruit in question, and comparing it with others, we had rather follow Linnæus. Michaux says *Dalibarda* differs from *Rubus*, nearly in the same manner as *Potentilla* from *Fragaria*; but this is incorrect. These latter are distinguished by the deciduous fleshy receptacle of *Fragaria*; the others merely by more or less pulp in the berry; for *Dalibarda* has not naked seeds, or "*semina exsucca*," but possibly *bacca exsucca*, a very different matter. We shall recur to the subject again under the following species.

55. *R. ? fragarioides*. Strawberry-leaved Bramble. (Dalibarda fragarioides; Michaux Boreali-Amer. v. 1. 300. t. 28. Curt. Mag. t. 1567. Pursh v. 1. 350. Ait. v. 3. 271. Poiret in Lamarck Dict. v. 6. 250.)—Leaves ternate; leaflets all sessile, wedge-shaped, notched and serrated, fringed. Stalks radical, many-flowered. Calyx tubular at the base.—Native of shady beech woods in Canada, and of the Alleghany mountains, flowering in May and June. We have seen no specimen, but by the above plate, the root appears to be simple, oblong, woody and perennial. Leaves all radical, on longish slender stalks; the middle leaflet sessile like the rest, and very little larger. Flower-stalks longer than the leaves, somewhat panicled, bearing about five flowers, the size of the last. Calyx remarkably elongated, and inversely conical, at the base, with ovate, finally reflexed, segments. Petals ovate, said to be yellow. Stamens numerous; their filaments permanent, erect. Of the particular structure of the fruit we find no account. This species, with its yellow flowers, and tubular calyx, to say nothing of the herbage, is so unlike the other *Dalibarda*, that it weakens, instead of confirming, that supposed genus. We presume not to say, without actual examination, what it most resembles. Pallas, it seems, made this plant a *Dryas*. We place it here merely for further enquiry. Dr. Sims in Curtis's Magazine remarks that the calyx sometimes betrays an inclination to have intermediate segments, a very curious, though puzzling, circumstance.

56. *R. radicans*. Creeping Peruvian Bramble. Cavan. Ic. v. 5. 7. t. 413. Poiret in Lamarck Dict. v. 6. 249.—Leaves ternate; leaflets all stalked, heart-shaped, villous, serrated. Stem creeping, prickly. Stalks radical, single-flowered. Calyx notched. Gathered by Lewis Néé, in the woods of Chili, growing at the roots, or on the rotten trunks, of trees, bearing flowers and fruit in February. The stem is quite prostrate, armed with short prickles, spreading

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ing to a great extent, and fixing itself here and there, as it runs, by fibrous roots. Leaves several from each part where the roots are produced, forming a tuft, accompanied by a solitary, long-stalked, pale red flower, rising above the leaves, and succeeded by an ovate greenish berry, composed of numerous grains, all together the size of a currant, and said to be very agreeably flavoured. The calyx is reflexed when in fruit, its segments oblong, acute, with many deep notches. Petals roundish, obtuse.

RUBUS, in Gardening, contains plants of the under-shrubby and herbaceous perennial kind, of which the species cultivated are, the raspberry (*R. idæus*); the Virginian raspberry (*R. occidentalis*); the flowering raspberry (*R. odoratus*); the common bramble (*R. fruticosus*); the brittle bramble (*R. hispidus*); the dewberry bramble (*R. cæsius*); the dwarf crimson bramble (*R. arcticus*); and the mountain bramble, or cloud-berry (*R. chamæmorus*).

In the first species the varieties are, the red-fruited, the white-fruited, the twice-bearing, of which the first crop ripens in July, and the second in October, those of the latter season having seldom much flavour; the smooth raspberry, and the large Antwerp. But the sorts mostly cultivated, according to Mr. Forsyth, are, the early white, the double-bearing white, the large common white, the large red, the red Antwerp, the large white Antwerp, the smooth cane double-bearing, and the Woodward's new raspberry.

In the fourth sort there are several varieties; but that which is chiefly introduced as a garden shrub, is the double-flowered bramble.

Method of Culture.—In the first sort and varieties of these plants it may be effected by suckers and layers. The plants should always have a portion of ground to themselves, being planted at the distance of about six feet from row to row, and four in the rows, with the exception of the early white sort, which may be set out closer. And according to Mr. Forsyth, the ground should first be well trenched over and dunged; then, making choice of the strongest and finest plants that come out from the sides of the stools, where they have been standing for some years, or encouraging the strongest plants that come out betwixt the rows after digging, which should be done annually, they may be planted out as above. In digging the ground, it frequently happens that the roots are cut with the spade, which occasions a great number of small plants to come up; of these the strongest and finest should be selected, hoeing up all the superfluous ones. But he prefers laying down some of the strongest outside shoots in the month of March; as, by the following autumn, they will make fine roots, and may be planted out in a quarter, or piece of ground, where they are intended to remain. These will not be so liable, he thinks, to throw out suckers as those which are produced from suckers. The fresh pieces of ground should always be planted in moist weather, as the roots are very delicate, and liable to hurt, when exposed to a dry air. If, however, they are planted in dry weather, he advises that care be taken to moisten the roots with water, and cover them well with wet litter, or leaves, during the time in which they are planting out. In performing the work, a trench should be opened with a spade, along the line where the suckers or layers are to be planted, cutting off all the small fibry roots with a knife, leaving only the stronger roots; putting them into the trench, and covering them with some earth; then watering them well, and throwing the remainder of the earth over them, letting them remain till you have finished planting the piece; then, where you first began to plant, beginning to tread the ground with the foot as hard as possible along each of the trenches, and in the same direction as planted; then

with a spade levelling all the ground smooth, and running it over with a rake, taking off any stones and rubbish that may be left on the surface, so as to render it perfectly even. The plants should be watered two or three times a week, when the season is dry, till they have taken root; and it will be necessary to stake the Antwerp, and other strong growing sorts, with stout stakes, running a couple of small rails at top to tie the branches to, which will prevent their being broken by the wind, or beaten down by the rain. The early white, and smaller sorts, may be plaited together at top, tying them round with the small yellow willow, which will keep them together. Some of the early raspberries may be planted between the trees on a west aspect, to produce early fruit before those in the quarters come in. The Antwerps thrive exceedingly well against north walls or palings, and produce late crops. Such as are planted against walls or palings should be tacked to them, to keep them in their places.

And it is advised that where any of the small red and white sorts are found, they should be destroyed, planting the large red, the smooth cane double-bearing, the large red and white Antwerps, the large common white, the double-bearing white, and Woodward's new raspberry in their stead. In respect to the cutting or pruning of these plants, some, Mr. Forsyth remarks, prefer pruning them in autumn, a practice of which he by no means approves. As they bear the fruit on the wood of the preceding year, they are, he thinks, very liable to be killed by the frost in severe winters; but, by deferring the pruning till the month of February, there will be a great choice of fine wood for bearing the following summer, being careful to root out or cut down all the wood that bore fruit the preceding year, which generally dies, selecting only from five to seven of the most vigorous and strong shoots from the last year's wood to bear fruit the ensuing season. These shoots may be pruned to the length of three or four feet, according to their strength, when they are of the smooth cane double-bearing sort (which generally bears a second crop in autumn, and will, in fine seasons, continue bearing from June to November); but, if the large Antwerp, the shoots should be left five or six feet long in these prunings.

But in regard to the early white, which never grows so strong as the above sorts, it should be shortened to two feet and a half, or three feet. These should be planted in rows about three feet distant from each other, and two feet from plant to plant in the rows; always remembering to keep them clear of suckers, and to cut out the dead or last year's wood, as above; making choice of the strongest shoots for bearing wood. Great care should, however, be taken not to cut off the little spurs on the sides, which bear the fruit in this kind. Plants of this sort continue in bearing five or six years; by which time a fresh plantation should be in readiness to succeed them. The young plants often bear some fruit the first year, and come into full bearing in the second after planting. If they be suffered to remain more than five or six years on the same ground, they degenerate, and bear small fruit. And much care should be taken not to leave above eight or ten of the strongest shoots, rubbing off or pulling up all the superfluous ones; and keeping the ground well hoed and cleared of weeds between the rows, as well as in other places.

Also in the other sorts the increase may be effected by suckers, layers, cuttings, and dividing the roots, and in the two last, or herbaceous kinds, by seed. The suckers should be taken up in autumn, winter, or spring, with roots; and the strongest be planted at once into the shrubbery, and the others in nursery-rows for a year or two, or till wanted for

planting. The layers should be made from the shoots, which may be done almost any time, as they readily emit roots at every joint, and become fit to plant out in the autumn following. And the cuttings should be taken off from some of the younger shoots, and divided into lengths a foot long, and planted in a shady border, either in the spring or summer season. The roots in any of the raspberry and herbaceous sorts, when increased into large bunches, may be divided or slipped into several distinct sets, and planted out separately.

The last two sorts may likewise be raised from seeds, which should be taken from the ripened fruit, and sown in a moist situation where the plants are to remain, keeping the young plants clean afterwards.

Both the first species, and all the varieties, are highly useful for their fruit; for the table, preserving, and other culinary purposes.

And most of the other sorts afford variety in the borders, clumps, and other parts of pleasure-grounds, among other hardy plants.

RUBUS, in *Ichthyology*, a name given by Joannes Cuba, Albertus, and some other writers, to the species of *ray*, usually called the *skate*, or *flaire*. See RALA (BATIS and RUBUS).

RUBY, *Spinelle*, Fr., in *Mineralogy*, a precious stone, much valued by jewellers; but under this name a variety of minerals have not unfrequently been sold, which differ essentially in their characters. Mineralogists have also disagreed much in the classification of substances to which they have given the name of ruby. The oriental ruby is, in fact, a red variety of the sapphire, and is described under the article GEMS. It possesses greater hardness than the common ruby, and differs from it in its crystallization. The primitive form of the crystals of the common ruby is the regular octahedron, from which the secondary forms vary but little. Two crystals are sometimes united, and form a macle. The colour is red, varying from scarlet to violet and yellowish-red, and sometimes a dark red. It is infusible by the blowpipe, nor does it lose its colour by the heat. The fracture is flatly conchoidal; it has a splendid vitreous lustre. The ruby possesses a considerable degree of hardness, though its principal constituent ingredient is alumine. According to Vauquelin, it contains

Alumine	-	-	84.47
Magnesia	-	-	8.78
Chromic acid	-	-	6.18

To the chromic acid the common ruby owes its colouring matter. A variety of ruby has received from Häuy the name of Pleonaste; it differs from the above in containing iron in place of chromic acid, and the colours vary from a purple to blue and green. Another gem nearly resembling the ruby, the spinelle zinfere of Häuy, called also automalite, has been classed as a sub-species of ruby, but it differs from it greatly in its constituent parts.

Automalite, like the common ruby, has the octahedral crystallization, with laminæ parallel to the faces of the crystal; its colour is a dark blueish-green, nearly opaque. The constituent parts, according to Vauquelin, are,

Alumine	-	-	42
Silex	-	-	4
Oxyd of zinc	-	-	28
Oxyd of iron	-	-	5
Sulphur	-	-	17

The ruby, in its most perfect state, is a gem of very great beauty and value. It is often found perfectly pure, and free from all spots or blemishes; but it is much more frequently debased by them, and greatly brought down in

its value, especially in the larger specimens. It is of very great hardness, equal to that of the sapphire, and second only to the diamond. It is various in size, but is less subject to variations in its shape than most of the other gems. It is most frequently found very small; its common size being that of the heads of the larger sort of pins; and when of this size it is very cheap; but it is also found of four, six, or ten carats; and sometimes, though but very rarely, up to twenty, thirty, or forty; nay, we have accounts of some of more than a hundred. It is never found of an angular or crystalliform shape, but always of a pebble-like figure, often roundish, sometimes oblong, and much larger at one end than the other, and in some sorts resembling a pear, and is usually more or less flattened on one side.

It is commonly so naturally bright and pure on the surface as to need no polishing; it is worn in rings, and in the crowns of princes, in its rough or native state. Its colour is red in very different degrees, from the deepest garnet colour to that of the palest red diamond, but it ever has with the red more or less of a purplish tinge. This is very plainly distinguished in the deeper coloured specimens, but in the pale ones is gradually less and less to be distinguished in proportion to their degree of colour. These are the distinguishing characters of the ruby, and by these it is easily known from the garnet, carbuncle, and other red gems.

Our jewellers are very nice, though not perfectly determinate in their distinctions; knowing this gem, in its different degrees of colour, under three names; the first is simply the *ruby*: this is the name they give to it in its most perfect and strongest coloured state.

The second is the *spinel* ruby. Under this name they know those rubies which are of a somewhat less deep and much less vivid colour than what they call the true ruby, or simply the ruby.

The third is the *balafs* ruby, a name derived from Bala-keia, the name of a country where the paler rubies are principally found. Under this name they express a pale, yet a very bright ruby, with a smaller admixture of the purple tinge than in the deeper coloured one, and something resembling the colour of the damask rose. This is of a considerable value, but less than the deeper, or, as they call it, the true ruby.

Besides these, they know also two other stones under the general name rubies, calling them the *rock ruby*, and the *rubacelle*. But these are not truly of the ruby kind; the first being a very beautiful species of garnet, and having a tinge of blue with its red; and the other a hyacinth, having a manifest cast of yellow. See GEMS.

There are but two places in the East where the ruby is found; the kingdom of Pegu, and the isle of Ceylon. The mine in Pegu, where it is found in greatest plenty, is in the mountain Capelan, twelve days' journey from Siren, the residence of the king of that country. The finest rubies brought hence do not exceed three or four carats; the king reserving all the larger to himself.

In Ceylon the rubies are found in a river which descends from the mountains towards the middle of the island: some few are also found in the ground. The rubies of Ceylon are usually brighter and more beautiful than those of Pegu, but they are rare; the king of Ceylon prohibiting his people to gather them, or traffic with them. There are, as some say, rubies also found in Europe, particularly in Bohemia and Hungary, especially the former, in which is a mine of flints of divers sizes; which, upon breaking, are sometimes found to contain rubies, pretended to be as fine and hard as any of the Eastern ones.

The Greeks call the ruby *αργυρος*, *q. d.* resisting the fire. The ancients, out of their credulity and superstition, attributed many virtues to the ruby; as that it expels poisons, cures the plague, abates luxury and incontinence, banishes sorrow, &c.

It is said the inhabitants of Pegu have the art of heightening the redness and brilliancy of rubies, by laying them in the fire, and giving them a proper degree of heat; but this seems a very erroneous account.

The ruby is formed in a stony substance, or bed, of a rose-colour, called *mother of ruby*; it has not all its colour and lustre at once, but comes to it by degrees. At first it is whitish; and, as it approaches to maturity, becomes red. Hence we have white rubies, others half-white, half-red, and others blue and red, called *sapphire rubies*. When a ruby exceeds twenty carats, it may be called a *carbuncle*; the name of an imaginary stone, of which the ancients and moderns have given us so many descriptions.

They have several modes of counterfeiting rubies; and some have carried the imitation to that length, that the most able lapidaries, till they come to try the hardness, are sometimes deceived.

Frutiere assures us very positively, that there have been rubies in France of two hundred and forty carats. Tavernier tells us he saw one in the Indies of fifty carats, which he had a mind to have bought. He adds, that the king of France has finer and larger rubies than any in the possession of the great Mogul.

The largest ruby that is known to be in the world was brought from China to prince Gargarin, governor of Siberia. It came afterwards into the hands of prince Mentchikof, and is at present one of the ornaments of the imperial crown of Russia.

RUBY, Sapphire. See SAPPHIRE and GEMS.

RUBY, Counterfeit. See GEMS, Ruby GLASS, and Ruby PASTE.

RUBY, in Chemistry, is a name given to several preparations of natural bodies, because of their red colour: as,

RUBY of Arsenic, &c. See REALGAR.

RUBY, in Heraldry, denotes the red colour with which the arms of noblemen are blazoned; being the same which, in the arms of others, not noble, is called *gules*.

RUBY-Throat, Latham, in *Ornithology*. See MOTACILLA *Calliope*.

RUCCELLA, LA, in *Geography*, a town of Sicily, in the valley of Demona; 7 miles S.W. of Cefalu.

RUCCELLAI, BERNARDO, in *Biography*, was born of a noble family at Florence in 1449. At the age of seventeen he married Nannina, daughter of Piero, and sister of the illustrious Lorenzo de Medici, which gave him great influence, and raised him to the highest posts in the republic. In 1480 he was appointed to the office of gonfalonier of justice; and four years afterwards he went as ambassador to the state of Genoa. In 1494 he was deputed, in the same quality, to Ferdinand, king of Naples, and afterwards to Charles VII. king of France. With his public employments he joined that cultivation of polite literature, which was frequent among the Florentines in the age of the Medici. He was intimately acquainted with Marsiglio Ficino, of whose academy he was at first one of the chief ornaments, and afterwards the firmest support. After the death of Lorenzo he was the munificent patron and protector of the Platonic academy, for the use of which he erected a sumptuous edifice, with fine gardens and groves, furnished with monuments of antiquity, serving as well for ornament as instruction. In the revolutions which followed the subversion of the Medici interest, Rucellai in-

curred the charges of ambition and inconstancy, by favouring sometimes one party and sometimes another: but, according to Mr. Roscoe, his crime, in the eyes of the Florentine historians of the succeeding century, was "an ardent love of liberty, which he preferred to the claims of kindred, and the expectations of personal aggrandizement." On the accession of Leo X. he declined the office which his countrymen would have conferred upon him of going as public orator to congratulate the pontiff, foreseeing, probably, in his elevation, the ruin of the liberties of Florence. He died in 1514, and was buried in the church of St. Maria Novella, the front of which, begun by his father, was finished by him with great magnificence. The following are the works of this patron of literature: "De Urbe Roma," which is a commentary on the description of Rome by Publio Vittore, in which he collected from all the ancient writers whatever would serve to convey a just idea of the grandeur of that capital; "De Magistratibus Romanis;" "De Bello Italico;" and "De Bello Pisano:" these have been compared with the history of Sallust. Bernardo was a poet in his own tongue; and a piece of his, entitled "Trionfo della Calumnia," was printed among the "Canti Carnascialeschi," at Florence in 1759. Roscoe's Lorenzi de Medici.

RUCCELLAI, GIOVANNI, son of the preceding, a distinguished Italian poet, was born in 1475. Improving the advantages which he naturally enjoyed under his father's roof, he became a distinguished scholar, and in 1505 the republic of Florence nominated him ambassador to the Venetian state. He took a very active part in the tumult raised by the younger citizens in the year 1512, to promote the return of the Medici to Florence. Upon the elevation of pope Leo X., who was his relation, Giovanni, in hopes of preferment, repaired to Rome, and entered into the ecclesiastical order: and in 1515 he attended Leo on his visit to Florence, on which occasion the pontiff was entertained in the Rucellai gardens with the representation of the tragedy of "Rosmonda," written by Giovanni. Leo shewed the greatest attachment to his relation, and sent him, at a very critical period, as nuncio to the court of Francis I., where he was at the death of Leo X. On that event he returned to Florence, and was sent to Rome to congratulate the new pope Adrian VI. on his accession. In this, as well as in the pontificate of Leo X., and also in the succeeding one of Clement VII., to whom he was related, he had the most sanguine hope of promotion to a cardinalate. He died in 1526, without attaining to the object of his ambition. As an author, Giovanni is known by "Le Api," The Bees, which is a didactic poem in unrhymed verse, and bears a high rank among Italian compositions in that class. His tragedy Rosmonda, already noticed, and his Orestes, are imitations, the former of the Hecuba of Euripides, the latter of the Iphigenia in Tauris. Roscoe's Leo X.

RUCHENWALDE, in *Geography*, a town of Brandenburg, on the Ucker Mark; 2 miles N.E. of Storkow.

RUCHT, a river of France, which runs into the Roer, near Hermbach.

RUCK, in *Rural Economy*, a provincial term, signifying a rude heap or bundle of any thing.

RUCKENSTEIN, in *Geography*, a town of the duchy of Carniola; 6 miles W. of Gurkfeld.

RUCKERSDORF, a town of Bavaria, in the territory of Nuremberg; 8 miles W. of Lauf.

RUCKERSWALDE, a town of Silesia, in the principality of Neisse; 5 miles E.S.E. of Neisse.

RUCKINGEN, a town of Germany, in the county of Ifenburg, on the Kinzig; 5 miles N.E. of Hanau.

RUCTATION, RUCTUS, in *Medicine*, belching, an involuntary discharge of flatus from the stomach, sometimes accompanied with a portion of the solid or liquid contents of that organ.

This is usually one of the symptoms of indigestion, whether arising from a morbid condition of the stomach, or from a temporary overloading of it with too much food, or with food of an acrid, heavy, or indigestible quality, or such as is disposed to pass into fermentation. There is a natural tendency in the food, especially the vegetable portion of it, to the process of fermentation, and the consequent evolution of air; but by the influence of the gastric juice, when it is sufficient to accomplish the digestive process, this tendency is counteracted, and no air is evolved. Whence the best remedy for eructation is the improvement of the digestive power, and the avoiding of fermentative food. See INDIGESTION.

RUD, in *Ichthyology*. See *CYPRINUS Carassus*, and *CYPRINUS Erythrophthalmus*.

RUD, in *Rural Economy*, a term provincially signifying a sort of red ochre.

RUDAW, in *Geography*, a town of Prussia, in the province of Natangen; 12 miles S.W. of Lick.—Also, a town of Prussia, in the province of Samland, formerly fortified with a castle, now in ruins. Some monuments of Pagan idolatry still remain in the vicinity of Rudaw; and also a stone pillar in a field near Tranzou, erected in commemoration of a victory obtained by the knights of the Teutonic order in 1370, over Kinstud, great duke of Lithuania; 12 miles N.N.W. of Königsberg.

RUDBECK, JOHN, in *Biography*, a learned Swedish bishop, was born about the year 1581. After having obtained the elementary parts of education, he was entered at the university of Upsal, where he made such progress in the higher branches of learning, that before he had completed his twenty-third year he was appointed professor of mathematics, which, in 1610, he exchanged for his professorship of Hebrew. On the coronation of Gustavus Adolphus, he took his degree in theology, and in 1619 he was nominated to the bishopric of Vesteras. In consequence of some strong expressions which he made use of in a public oration, a violent dispute took place between him and professor Messenius, which was carried so far, that the king was obliged to interfere, and to allay the angry passions of the disputants, his majesty appointed Messenius assessor in one of the courts of justice; and in 1613 he made Rudbeck one of his own chaplains. It was owing, in a great measure, to the zeal and exertions of this prelate, that the Swedish bible, known among the learned as the Bible of Gustavus Adolphus, was published in 1618. He is also known and highly esteemed in his own country for the considerable donations which he made to the gymnasium of Vesteras, and for his aid in the improvement of other useful institutions; he died in 1646. He was author of several theological works, of which the titles are given in the General Biography. Among these was one, entitled "Privilegia quædam Doctorum, Magistrorum, Præcalæureorum, Studioforum, et Scholarum omnium, &c." This work, which excited great attention, had nearly proved the author's ruin, and was, very soon after the publication, prohibited by a decree of the senate. Upon this occasion, one of the members of the senate asserted, that a more dangerous book had scarcely ever appeared, and that it was necessary the publisher should make oath that he had not retained a single copy. It prevented the promotion of the prelate, who

would otherwise probably have been raised to the rank of archbishop.

RUDBECK, OLOF, or OLAUS, a man of very extensive learning and accomplishments, who if not, strictly speaking, the father of natural science in Sweden, must be reckoned among its earliest and most distinguished patrons and cultivators, was the son of John Rudbeck, bishop of Vesteras; an honest and uncourtly bishop, who spoke truth, and was never promoted. The son had a great and vigorous mind, somewhat over-luxuriant in speculation and hypothesis, but sagacious in discovery, and indefatigable in application. He was born in 1630, and educated at Upsal. Anatomy was his earliest study, and he prosecuted it with such success, that at the age of nineteen or twenty he made the important discovery of the lymphatic vessels in the liver, and, soon afterwards, of those of other parts of the body. His inaugural dissertation, in 1652, treated of the circulation of the blood. Bartholine contended with Rudbeck for the originality of the discovery of the lymphatic system, and they appear to have made it independent of each other; though Haller gives the priority, in point of time, to Rudbeck. See BARTHOLINE, THOMAS.

The university of Upsal was, at this time, advancing rapidly towards that celebrity which it has now so long maintained. Enriched with the patrimonial estates of the great Gustavus Vasa, its funds have ever been ample, and the good sense of its directors has generally led them to a right application of these resources. Rudbeck, however, having made Botany a part of his pursuits, contributed, out of his own means, to the advancement of that science. He founded a garden, which he afterwards gave to the university. He visited Holland in 1653, but returning home next year, devoted himself to the study, and, we presume, to the practice of medicine, as well as to the instruction of his pupils in anatomy. In 1658 he was appointed professor of medicine, and was fixed at Upsal for the remainder of his life. It appears that he married before the age of thirty, his son, the subject of our next article, having been born in 1660, but we have no particular account of Rudbeck's domestic history. Besides the attention which he gave to the above-mentioned pursuits, he very early addicted himself to the study of languages, history, antiquities, architecture, and music, as well as the practical art of drawing. He so far took the lead in matters of taste, that the public festivals and decorations, at the coronation of the young king Charles XI., in 1660, were put entirely under his direction.

The first botanical publication of Rudbeck seems to have been his Catalogue of the Upsal Garden, printed in 1658, the year after the establishment of that collection. To this little volume a preface in Latin and Swedish is prefixed, treating of practical horticulture, and recommending botany for its agreeableness and utility. The list is, of course, not very ample, but contains several exotic species and varieties; and when the author complains of a sharp frost on the 24th of July, we cannot but allow the protection of stoves and greenhouses to have been of the most imperious necessity, so that he could scarcely, in one year, have sufficiently provided them. An Appendix to this catalogue was printed in 1666, the garden having been, by that time, considerably enriched. The same year, 1666, not, as Linnæus has it, 1664, another similar work appeared, *Delicia Vallis Jacobæ*; a catalogue, alphabetical like the former, of a garden at Jacob's Dahl, near Stockholm, belonging to count Magnus Gabriel de la Gardie, chancellor of the kingdom of Sweden, as well as of the university of Upsal. This, though anonymous, is attributed by Linnæus

RUDBECK.

to Rudbeck. It is a little book of extreme rarity, inasmuch that Haller speaks of it by report only. A Latin poem is prefixed to the work, describing the beauty of this villa, its orangery, aviary, plantations, and fountains.

We know not at what period of his life Rudbeck first conceived the vast project of his *Campi Elysi*, in which all the plants in the world, as far as they had been discovered, were to be represented by wooden cuts, in twelve folio volumes, disposed according to Bauhin's *Pinax*. For this stupendous work he is said to have prepared ten or eleven thousand figures. The first and second volumes were already printed, when a dreadful fire reduced almost the whole town of Upsal to ashes, in the year 1702. Three copies only of the first volume escaped the fire, two of which remain in Sweden, and the third is preserved in the Sherardian library at Oxford. A few leaves of this last copy, having been deficient, are supplied in manuscript. A number of the blocks of this very volume, which consists of grasses and their allies, came into England with the Linnæan collection; and having been compared with the Oxford copy, an impression of them was given to the public in 1789, under the title of *Reliquiæ Rudbeckianæ*, the appropriate letter-press of each figure, and the Linnæan names, being subjoined. An historical preface is prefixed to this edition, as well as a dedication to Dr. John Gustavus Acrel, Professor of Medicine at Upsal, who was entrusted with the sale of the Linnæan museum and library. (See LINNÆUS.) The object of the dedication is to bear testimony to the honourable conduct of this gentleman, who, because he would not act unjustly, was accused of having received a bribe of 100 pounds, so moderate is the standard of bribery in Sweden, to betray the interest of the proprietors. Perhaps this report arose from his rejecting, for them, the offer of the same sum, from another quarter, to forfeit their engagement to the person with whom they had treated, and to whom he indignantly communicated the proposal.

The second volume of the *Campi Elysi* came from the press a little before the former; so that several copies, having got abroad, escaped the destruction of the rest. Even this, however, is a very rare book, the price of which can hardly be estimated. A copy was bought by professor Jacquin in Germany, many years ago, for about 30 guineas. This volume is in the Linnæan, Banksian, and Sherardian libraries. Containing liliaceous plants, and the Orchis tribe, it is much more splendid than the first. The figures are copied from all quarters, though several are original, and amount to about 600 in all, many of them executed with great correctness and elegance, more especially after the fine engravings of the Hortus Malabaricus. There are, of course, several repetitions of the same species, and abundance of garden varieties of Tulips, &c. The *Orchideæ* are numerous, but inferior, as to the correctness of their flowers, to some other plants, a defect arising from their singularity or minuteness. The preface attributes the anticipated publication of this volume to the greater popularity and attraction of its contents; and speaks of many of the intended figures of the whole work, as to be executed from drawings made by the author himself, after original specimens, either preserved in Burser's fine Swiss herbarium, or obtained from other quarters. The author speaks of his son and nephew, each of the same name with himself, as his coadjutors, and the destined continuators of this laborious undertaking. The destruction of his materials is extremely to be regretted; for such a repository of the botanical knowledge of the time, would have been highly valuable to succeeding writers; particularly as illustrating the plants of Bauhin, so many of which are to be determined from Burser's herbarium only.

The volume in question stands alone, like the single unrivalled column of the temple of peace at Rome, a perpetual cause of regret, and a monument of irrevocable destruction.

Another great work of our author, on which, most of all perhaps, his literary celebrity depends, is entitled *Atlantica*, and ought to consist of four volumes in folio; but of these the fourth, at least, if we mistake not, is to be met with in manuscript only. The others are extremely rare, probably from the accident of the fire above-mentioned. One alone, composed of wooden cuts, is in our possession. The aim of this singular, but profoundly learned, performance, was to prove that Sweden had been the terrestrial paradise of our first parents, the *Atlantis* of Plato, and the source of all learning, ancient mythology, arts, and sciences. By a passage in Linnæus's Lapland Tour, v. 1. 19, it should seem that Rudbeck had fixed the scene of the Trojan war at a village in Gestrickland, which bears the name of Troye. The reader will no longer wonder at this, when, in one of our author's illustrative maps, he finds Helicon stationed in Lapland; the Fortunate Islands at the Orkneys; and Acheron at the Mæltrom, off the coast of Norway. The church of old Upsal, certainly a hyperborean temple of the simplest form, and the most remote antiquity, is supposed to have been a fane of Apollo. It is square, with two round-arched door-ways at each side, but no windows. Rudbeck compares it with the temple of Janus at Rome, and shews how the present cathedral of Upsal originated from the plan of a similar edifice. In these points his remarks are well worthy of attention. Those who cannot help smiling at the wildness of some of his hypotheses, must respect his learning and ingenuity, and his work is said to have excited much attention when it first appeared. At present it ranks chiefly among the baubles of mere collectors, for the sake of its rarity.

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mentali

RUCKINGEN, a town of Germany, in the county of Ifenburg, on the Kinzig; 5 miles N.E. of Hanau.

RUCTATION, RUCTUS, in *Medicine*, belching, an involuntary discharge of flatus from the stomach, sometimes accompanied with a portion of the solid or liquid contents of that organ.

This is usually one of the symptoms of indigestion, whether arising from a morbid condition of the stomach, or from a temporary overloading of it with too much food, or with food of an acrid, heavy, or indigestible quality, or such as is disposed to pass into fermentation. There is a natural tendency in the food, especially the vegetable portion of it, to the process of fermentation, and the consequent evolution of air; but by the influence of the gastric juice, when it is sufficient to accomplish the digestive process, this tendency is counteracted, and no air is evolved. Whence the best remedy for eructation is the improvement of the digestive power, and the avoiding of fermentative food. See INDIGESTION.

RUD, in *Ichthyology*. See CYPRINUS *Carassus*, and CYPRINUS *Erythrophthalmus*.

RUD, in *Rural Economy*, a term provincially signifying a sort of red ochre.

RUDAW, in *Geography*, a town of Prussia, in the province of Natangen; 12 miles S.W. of Lick.—Also, a town of Prussia, in the province of Samland, formerly fortified with a castle, now in ruins. Some monuments of Pagan idolatry still remain in the vicinity of Rudaw; and also a stone pillar in a field near Tranzou, erected in commemoration of a victory obtained by the knights of the Teutonic order in 1370, over Kinstud, great duke of Lithuania; 12 miles N.N.W. of Königsberg.

RUDBECK, JOHN, in *Biography*, a learned Swedish bishop, was born about the year 1581. After having obtained the elementary parts of education, he was entered at the university of Upsal, where he made such progress in the higher branches of learning, that before he had completed his twenty-third year he was appointed professor of mathematics, which, in 1610, he exchanged for his professorship of Hebrew. On the coronation of Gustavus Adolphus, he took his degree in theology, and in 1619 he was nominated to the bishopric of Vesteras. In consequence of some strong expressions which he made use of in a public oration, a violent dispute took place between him and professor Messenius, which was carried so far, that the king was obliged to interfere, and to allay the angry passions of the disputants, his majesty appointed Messenius assessor in one of the courts of justice; and in 1613 he made Rudbeck one of his own chaplains. It was owing, in a great measure, to the zeal and exertions of this prelate, that the Swedish bible, known among the learned as the Bible of Gustavus Adolphus, was published in 1618. He is also known and highly esteemed in his own country for the considerable donations which he made to the gymnasium of Vesteras, and for his aid in the improvement of other useful institutions; he died in 1646. He was author of several theological works, of which the titles are given in the General Biography. Among these was one, entitled "Privilegia quædam Doctorum, Magistrorum, Præcalæureorum, Studioforum, et Scholarum omnium, &c." This work, which excited great attention, had nearly proved the author's ruin, and was, very soon after the publication, prohibited by a decree of the senate. Upon this occasion, one of the members of the senate asserted, that a more dangerous book had scarcely ever appeared, and that it was necessary the publisher should make oath that he had not retained a single copy. It prevented the promotion of the prelate, who

would otherwise probably have been raised to the rank of archbishop.

RUDBECK, OLOF, or OLAUS, a man of very extensive learning and accomplishments, who if not, strictly speaking, the father of natural science in Sweden, must be reckoned among its earliest and most distinguished patrons and cultivators, was the son of John Rudbeck, bishop of Vesteras; an honest and uncourtly bishop, who spoke truth, and was never promoted. The son had a great and vigorous mind, somewhat over-luxuriant in speculation and hypothesis, but sagacious in discovery, and indefatigable in application. He was born in 1630, and educated at Upsal. Anatomy was his earliest study, and he prosecuted it with such success, that at the age of nineteen or twenty he made the important discovery of the lymphatic vessels in the liver, and, soon afterwards, of those of other parts of the body. His inaugural dissertation, in 1652, treated of the circulation of the blood. Bartholine contended with Rudbeck for the originality of the discovery of the lymphatic system, and they appear to have made it independent of each other; though Haller gives the priority, in point of time, to Rudbeck. See BARTHOLINE, THOMAS.

The university of Upsal was, at this time, advancing rapidly towards that celebrity which it has now so long maintained. Enriched with the patrimonial estates of the great Gustavus Vasa, its funds have ever been ample, and the good sense of its directors has generally led them to a right application of these resources. Rudbeck, however, having made Botany a part of his pursuits, contributed, out of his own means, to the advancement of that science. He founded a garden, which he afterwards gave to the university. He visited Holland in 1653, but returning home next year, devoted himself to the study, and, we presume, to the practice of medicine, as well as to the instruction of his pupils in anatomy. In 1658 he was appointed professor of medicine, and was fixed at Upsal for the remainder of his life. It appears that he married before the age of thirty, his son, the subject of our next article, having been born in 1660, but we have no particular account of Rudbeck's domestic history. Besides the attention which he gave to the above-mentioned pursuits, he very early addicted himself to the study of languages, history, antiquities, architecture, and music, as well as the practical art of drawing. He so far took the lead in matters of taste, that the public festivals and decorations, at the coronation of the young king Charles XI., in 1660, were put entirely under his direction.

The first botanical publication of Rudbeck seems to have been his Catalogue of the Upsal Garden, printed in 1658, the year after the establishment of that collection. To this little volume a preface in Latin and Swedish is prefixed, treating of practical horticulture, and recommending botany for its agreeableness and utility. The list is, of course, not very ample, but contains several exotic species and varieties; and when the author complains of a sharp frost on the 24th of July, we cannot but allow the protection of stoves and greenhouses to have been of the most imperious necessity, so that he could scarcely, in one year, have sufficiently provided them. An Appendix to this catalogue was printed in 1666, the garden having been, by that time, considerably enriched. The same year, 1666, not, as Linnæus has it, 1664, another similar work appeared, *Delicia Vallis Jacobæ*; a catalogue, alphabetical like the former, of a garden at Jacob's Dahl, near Stockholm, belonging to count Magnus Gabriel de la Gardie, chancellor of the kingdom of Sweden, as well as of the university of Upsal. This, though anonymous, is attributed by Linnæus

RUDBECK.

to Rudbeck. It is a little book of extreme rarity, inasmuch that Haller speaks of it by report only. A Latin poem is prefixed to the work, describing the beauty of this villa, its orangery, aviary, plantations, and fountains.

We know not at what period of his life Rudbeck first conceived the vast project of his *Campi Elysi*, in which all the plants in the world, as far as they had been discovered, were to be represented by wooden cuts, in twelve folio volumes, disposed according to Bauhin's *Pinax*. For this stupendous work he is said to have prepared ten or eleven thousand figures. The first and second volumes were already printed, when a dreadful fire reduced almost the whole town of Upsal to ashes, in the year 1702. Three copies only of the first volume escaped the fire, two of which remain in Sweden, and the third is preserved in the Sherardian library at Oxford. A few leaves of this last copy, having been deficient, are supplied in manuscript. A number of the blocks of this very volume, which consists of grasses and their allies, came into England with the Linnæan collection; and having been compared with the Oxford copy, an impression of them was given to the public in 1789, under the title of *Reliquiæ Rudbeckianæ*, the appropriate letter-press of each figure, and the Linnæan names, being subjoined. An historical preface is prefixed to this edition, as well as a dedication to Dr. John Gustavus Acrel, Professor of Medicine at Upsal, who was entrusted with the sale of the Linnæan museum and library. (See LINNÆUS.) The object of the dedication is to bear testimony to the honourable conduct of this gentleman, who, because he would not act unjustly, was accused of having received a bribe of 100 pounds, so moderate is the standard of bribery in Sweden, to betray the interest of the proprietors. Perhaps this report arose from his rejecting, for them, the offer of the same sum, from another quarter, to forfeit their engagement to the person with whom they had treated, and to whom he indignantly communicated the proposal.

The second volume of the *Campi Elysi* came from the press a little before the former; so that several copies, having got abroad, escaped the destruction of the rest. Even this, however, is a very rare book, the price of which can hardly be estimated. A copy was bought by professor Jacquin in Germany, many years ago, for about 30 guineas. This volume is in the Linnæan, Banksian, and Sherardian libraries. Containing lilaceous plants, and the Orchis tribe, it is much more splendid than the first. The figures are copied from all quarters, though several are original, and amount to about 600 in all, many of them executed with great correctness and elegance, more especially after the fine engravings of the Hortus Malabaricus. There are, of course, several repetitions of the same species, and abundance of garden varieties of Tulips, &c. The *Orchideæ* are numerous, but inferior, as to the correctness of their flowers, to some other plants, a defect arising from their singularity or minuteness. The preface attributes the anticipated publication of this volume to the greater popularity and attraction of its contents; and speaks of many of the intended figures of the whole work, as to be executed from drawings made by the author himself, after original specimens, either preserved in Burser's fine Swiss herbarium, or obtained from other quarters. The author speaks of his son and nephew, each of the same name with himself, as his coadjutors, and the destined continuators of this laborious undertaking. The destruction of his materials is extremely to be regretted; for such a repository of the botanical knowledge of the time, would have been highly valuable to succeeding writers; particularly as illustrating the plants of Bauhin, so many of which are to be determined from Burser's herbarium only.

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mentali Plantarum Notitiâ ritè acquirendâ. In this he asserts the necessity of arranging and distinguishing the genera of plants by their fructification alone, and prefers such leading principles as are derived from the fruit, rather than from the corolla. He rejects habit, colour, sensible qualities, time of flowering, &c. on which so much stress has been laid by superficial observers; while, on the other hand, he declines being implicitly led by the more abstruse principles of certain more philosophical botanists. Some unfortunate errors of the press occur in pages 12, 13, &c. the terms *gymno-* and *angio-sperma* being often transposed. Rudbeck extends his remarks to nomenclature, and very much to the purpose. He had previously, at Upsal, in 1686, defended a thesis, *de Propagatione Plantarum*, which is less original, though highly creditable as a school exercise. The Upsal garden was founded immediately on his return, and enriched with seeds obtained from the collections in Holland.

On the 21st of May 1695, professor Rudbeck, junior, set out from Upsal on a tour to Lapland, accompanied by two young men, the sons of Count Gyllenborg. After his return he prepared a very ample account of his journey, having made a number of drawings for the purpose. The first part, published in 1701, in Latin and Swedish, is dedicated to king Charles XII. in a Latin, as well as Swedish, poem, and ornamented with a magnificent wood cut of the *Pedicularis Sceptrum-Carolinum*. But this volume; a thin quarto, goes no further than the province of Upland. The rest of the materials, except a collection of drawings of plants, which still exist, and perhaps rather belong to the *Campi Elysi*, seem to have perished in the fire of Upsal. Such indeed was the fate of most of the copies of the work just mentioned, entitled *Laponia illustrata*, which is therefore an extremely scarce book.

In 1720 Rudbeck, in conjunction with Benzelius, afterwards archbishop of Upsal, founded the Swedish Academy of Sciences, as it was then called, though subsequently, when other similar establishments arose at Stockholm, Lund, &c. the original one was entitled the Royal Academy of Upsal. This institution still flourishes, and has produced several volumes of Transactions in Latin. In the first, printed in 1720, is a catalogue of plants, observed by Rudbeck in Lapland, with cuts of *Lobelia Dortmanna*, and *Linnæa borealis*.

Several curious dissertations came forth, from time to time, from this learned man, which evince his deep erudition, though he betrays, like his father, somewhat of a paradoxical turn. He was particularly skilled in oriental literature, and was hence led to undertake the explanation of some of the most obscure subjects of natural history in the sacred scriptures. He contends that *Borith*, mentioned by some of the prophets, is neither an herb, nor any kind of soap, but a purple dye. He also undertook to demonstrate that the *Dudaim* were Raspberries. (See DUDAIM.) The perusal of these erudite speculations, instead of affording instruction on the subject discussed, rather leads us to the conviction, that a man who has so many tools at command, can turn and mould any subject as he pleases. The two dissertations in question appeared in 1733, in quarto. The author had previously given to the world three others, the inaugural essays of some of his pupils. These were on *Hedera*, in 1707, in 4to.; on *Mandragora*, in 1702; and on the *Rubus arcticus* of Linnæus, in 1716, both in 8vo., with good cuts. His most elaborate and eccentric performance of all, perhaps, is a dissertation on the bird *Selav*, which our translation of the bible renders a quail. Some have thought it a locust, but Rudbeck will have it a flying-fish; and as Johnson maliciously says of Milton, he is never

at a loss for a reason. Abundance of profound remarks are interperfed in this treatise. Amongst other things, the affinity of the Hebrew, Chinese, and Gothic languages is discussed. The younger Rudbeck died in 1740, highly respected. He left in manuscript a sort of universal lexicon, which has never been printed. Rudbeck, jun.'s Works. Haller Bibl. Bot. Aikin's Gen. Biog. Dryand. Bibl. Banks. S.

RUDBECKIA, in *Botany*, was dedicated by Linnæus to the memory of his great countrymen, Olof Rudbeck, father and son, his predecessors in the botanical chair at Upsal. (See RUDBECK.) A genus allied to *Helianthus* was well chosen for this purpose, a Sun-flower having been the emblem, or, some say, a part of the coat of arms, of the persons commemorated.—Linn. Gen. 440. Schreb. 574. Willd. Sp. Pl. v. 3. 2246. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 130. Pursh v. 2. 573. Juss. 189. Lamarck Illustr. t. 705. Gært. t. 172.—Class and order, *Syngenesia Polygamia-frustranea*. Nat. Ord. *Compositæ oppositifoliæ*, Linn. *Corymbifera*, Juss.

Gen. Ch. *Common Calyx*: a double row of flat, broadish, short scales, six in each row. *Cor.* compound, radiated. Florets of the conical disk numerous, perfect, tubular-funnel-shaped, five-cleft in the border; those of the radius about twelve, female, ligulate, very long, lanceolate, flat, pendulous, with two or three terminal teeth. *Stam.* in the perfect florets five, capillary, very short; anthers united into a cylindrical tube. *Pist.* in the perfect florets, germen square; style thread-shaped, the length of the partial corolla; stigma deeply divided, revolute: in the female florets, germen minute; style and stigma wanting. *Peric.* none, except the unchanged calyx. *Seeds* in the perfect florets only, solitary, oblong, each crowned with a membranous four-toothed border. *Recept.* chaffy, conical, longer than the common calyx. Scales the length of the seeds, erect, of a concave or channel-like form, deciduous.

Eff. Ch. *Receptacle* chaffy, conical. Seed crowned with a four-toothed border. Calyx of a double row of scales.

1. *R. laciniata*. Broad Jagged Rudbeckia. Linn. Sp. Pl. 1279. Willd. n. 1. Ait. n. 1. Pursh n. 12. (Aconitum helianthemum canadense; Cornut. Canad. 178. t. 179.)—Lower leaves pinnate; leaflets ovate, unequal at the base, toothed, somewhat three-lobed: upper ones undivided or three-cleft, ovate-oblong. Crown of the seeds four-toothed.—Native of North America. On the edges of swamps and ditches, from Canada to Virginia, flowering from August to October. *Pursh.* A hardy perennial in our gardens, where it has been known for nearly two centuries, flowering in autumn. The *stems* are from five to eight or ten feet high, erect, branched, furrowed, smooth. *Leaves* alternate, deep green, minutely rough, like a file, to the touch, pointed, variously divided. *Flowers* large, terminal, on long solitary *stalks*, erect; their radius of a full yellow; disk ovate, brown.

2. *R. columnaris*. High-crowned Rudbeckia. Pursh n. 11. Curt. Mag. t. 1601.—Stem simple, straight, with a few flowers, on long stalks, at the top. Leaves pinnatifid, cut, with linear segments. Calyx simple, five-leaved. Disk cylindrical, elongated.—Found on the banks of the Missouri, by Mr. Frazer, who has brought it to England. The singular appearance of the *receptacle*, which is quite cylindrical, flat at the top, distinguishes this from all other known species. The *rays* are from five to eight, lax, elliptical, jagged at the end. *Leaves* narrow, roughish.

3. *R. digitata*. Narrow Jagged Rudbeckia. Mill. Dict. n. 6. Ait. n. 2. Pursh n. 13. (Chrysanthemum americanum)

RUDBECKIA.

canum majus, foliis magis dissectis; Morif. v. 3. 22. sect. 6. t. 6. f. 54.)—Lower leaves pinnate; leaflets pinnatifid; upper ones deeply three-cleft, lanceolate, partly cut. Crown of the seeds crenate. Stem smooth.—Found on the mountains of Virginia and Carolina, flowering from August to October. *Pursh.* This resembles the first species, but has smaller flowers, and much narrower, rather smoother, leaves. The crown of each seed, besides having four teeth, is finely jagged, or crenate.

4. *R. pinnata.* Fragrant Pinnated Rudbeckia. Venten. Hort. Cels. t. 71. Sm. Exot. Bot. v. 1. 73. t. 38. Ait. n. 3. Pursh n. 14. Michaux Boreali-Amer. v. 2. 144. (*R. digitata*; Willd. n. 2.)—Leaves pinnate, somewhat subdivided. Crown of the seed entire at the edge. Stem rough.—Native of the western parts of Carolina and Georgia, where it flowers from July to October. *Pursh.* With us it is a hardy perennial, having been introduced, from the garden at Madrid, by seeds sent to the late lady Amelia Hume. Every part of the herbage is minutely rough. Flowers large and handsome, with the scent of anise; their rays deep yellow; numerous, broad, downy, pointing downwards; disk ovate, dark purple, almost black. Ventenat mistook this for the *digitata* of Miller and Aiton.

5. *R. triloba.* Three-lobed Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 3. Ait. n. 4. Pursh n. 9. (*Chrysanthemum cannabinum virginianum hirsutum, disco nigro, petalis aureis radiato*; Pluk. Almag. 100. Phyt. t. 22. f. 2.)—Leaves spatulate; the lower ones three-lobed; the upper undivided. Stem hairy, much branched. Calyx leafy. Scales of the receptacle with prominent points.—An inhabitant of the mountains of Virginia and Carolina, flowering in August and September. *Pursh.* Stem four or five feet high, much branched and spreading, leafy, striated, rough with pale, rigid, deflexed hairs, which are more erect on the branches. Leaves more or less shaggy with similar hairs. Flowers not much above an inch in diameter, pale yellow according to Mr. Pursh, but partly orange, or tawny, in our dried specimens. Outer scales of the calyx leafy, as long as the radiant florets. Disk convex, hardly conical, remarkable for the projecting needle-like points of the scales, between the florets. This has long been cultivated in France as well as England, where it is biennial, though sometimes perennial in Carolina.

6. *R. subtomentosa.* Downy Rudbeckia. Pursh n. 10. (*R. triloba* 3; Michaux Boreali-Amer. v. 2. 144.)—Downy, with short pubescence. Branches erect, many-flowered. Leaves oblong-lanceolate, acute, somewhat serrated; the lower ones three-lobed. Scales of the calyx close-pressed, shorter than the rays.—Native of mountain meadows, in Virginia and the country of the Illinois, flowering in August and September. Perennial, not near so tall as the preceding, from which it is very distinct. *Pursh.*

7. *R. Radula.* File Rudbeckia. Pursh n. 8.—Stem hispid below; smooth, and nearly naked, above. Stalks very long, single-flowered. Leaves ovate, tapering, tuberculated, hispid. Calyx imbricated; with ovate, pointed, fringed scales.—Gathered by Bartram in Georgia. Mr. Pursh described it from the Banksian herbarium. The root is marked as biennial. We have examined no specimen.

8. *R. hirta.* Great Hairy Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 4. Ait. n. 5. Pursh n. 7. (*R. foliis lanceolato-ovatis, alternis, indivisis, petalis radii bifidis*; Mill. Ic. t. 224. f. 1. *Obeliscothea integrifolia, radio aureo, umbone atro-rubente*; Dill. Elth. 295. t. 218.)—Rough with bristly hairs. Stem slightly branched, single-flowered. Flower-stalk elongated, naked. Leaves undi-

vided, ovate, somewhat spatulate, triply ribbed, serrated. Calyx leafy. Scales of the receptacle lanceolate, hairy.—Found on the mountains from Virginia to Florida, flowering from July to September. *Pursh.* Root biennial. Herb about two feet high, rough and hairy. Flower rather large, with a dark brown disk, and long yellow rays.

9. *R. fulgida.* Small Hairy Rudbeckia. Ait. n. 6. Willd. n. 5. Pursh n. 6.—Stem hispid. Branches straight, single-flowered. Leaves oblong-lanceolate, triply ribbed, toothed, rough; contracted, and somewhat heart-shaped, at the base. Calyx leafy. Scales of the receptacle lanceolate, fringed.—In mountain meadows and woods, from Pennsylvania to Carolina, flowering from July to October. *Pursh.* Said in Hort. Kew. to have been introduced into England, by the late Messrs. Kennedy and Lee, in 1760. This differs from the last in having a perennial root; branched stem; and smaller flowers, whose rays are of a deep orange-colour, and the disk dark purple. The scales of the calyx are shorter, broader, and more ovate.

10. *R. densifolia.* Crowded-leaved Rudbeckia.—Stem rough. Branches single-flowered. Leaves opposite, stalked, elliptic-lanceolate, rough, somewhat toothed. Calyx close-pressed, not half the length of the rays.—Gathered by Commerfon, on rocks at Monte Video. The stem seems rather shrubby, branched, round, clothed with numerous leaves, and very rough with minute depressed prickles, such as cover every part of the herbage. Leaves about an inch and half long, more or less acute, sometimes distantly toothed; the upper ones partly scattered. Flowers large, on long, rough, nearly leafless stalks. Scales of the calyx ovate, rough and fringed. Rays numerous, broad, yellow, ascending, almost thrice as long as the calyx. Disk brown, or purplish.

11. *R. decumbens.* Decumbent Rudbeckia.—Stem decumbent, creeping. Leaves opposite, stalked, linear-spatulate, nearly smooth. Flower-stalks erect, solitary, angular, very long and slender, slightly hairy.—Found by Commerfon on the rocks of Monte Video. The stems are woody, creeping by means of numerous radicles, ascending at the extremity only, but producing, as they go, a dense assemblage of short leafy shoots or branches. Leaves very various in size and breadth, obtuse, triply ribbed, rather fleshy, very slightly and occasionally hairy, nearly entire. Flower-stalks terminal, solitary, simple, single-flowered, erect and straight, naked, near a span long, being ten times the length of the leaves, of equal thickness throughout. Flowers about an inch in diameter, yellow in the disk as well as radius. Scales of the calyx ovate, acute, close-pressed, fringed with bristles, and about half the length of the rays. We have no means of investigating the receptacle, or seed-crown, but we presume, from the habit of every part, the genus can scarcely be doubtful.

12. *R. bellidioides.* Daisy-like Rudbeckia.—Stem decumbent. Leaves opposite, stalked, ovate, rough-edged. Flower-stalks erect, solitary, very long; swelling and very downy at the top.—This likewise was gathered by Commerfon, at Monte Video. Roots creeping, with thick fleshy fibres. Stems trailing, with short leafy branches, forming a sort of tuft, much as in the foregoing, but the leafy part does not appear to take root. Leaves tolerably uniform, from one and half to two inches long, and half an inch wide, obtuse, triply ribbed, entire; very rough on the ribs and margin; tapering down at the base into a broad fringed footstalk. Flower-stalks four or five inches long, situated as in the last species, but stouter, especially towards the flower, where they are densely covered with short, rigid, close-pressed hairs. Flowers entirely yellow, the size of the

last. Scales of the *calyx* close-pressed, ovate, half the length of the *radius*, smooth, except a slight marginal fringe; strongly ribbed, or furrowed, at the base. The younger Linnæus, as well as Commerfon, thought this a *Rudbeckia*, nor have we sufficient doubts on the subject to spoil a flower by dissection.

13. *R. aristata*. Awn-scaled Rudbeckia. Pursh n. 5.—“Stem hispid. Branches elongated, corymbose, single-flowered. Leaves lanceolate-oblong, serrated, hispid. Disk of the flower nearly hemispherical. Scales of the seed-crown awl-shaped, awned.”—Native of South Carolina; described by Mr. Pursh from the Banksian herbarium. The flowers are small, deep yellow. If there be no error in the above definition, and the seed be really crowned with separate awl-shaped scales, this species does not well answer to the character, or idea, of a *Rudbeckia*. The analogy of other species would lead us to suppose the scales of the *receptacle* were meant, had not the words “*paleis pappi*” been so precise.

14. *R. spatulata*. Spatulate-leaved Rudbeckia. Michaux Boreali-Amer. v. 2. 144. Willd. n. 6. Pursh n. 4.*—“Slender, finely downy. Stems single-flowered. Leaves obovato-spatulate, entire. Calyx spreading, imbricated. Radiant florets three-toothed.”—Gathered by Michaux on the mountains of Carolina; by Bartram in Florida. It is biennial, flowering in July and August. Pursh.

15. *R. discolor*. Two-coloured Rudbeckia. Pursh n. 4.—“Branches corymbose, single-flowered. Flower-stalks naked, elongated. Leaves lanceolate, nearly entire, rough with rigid hairs. Calyx-scales ovate, acute. Petals lanceolate, entire, of two colours, as long as the calyx.”—Gathered in Florida, by Bartram. Perennial. Flowers small; their rays yellow above, deep orange or purple underneath. Pursh. We have not examined a specimen of either of the two last, both which Mr. Pursh described from sir Joseph Banks’s herbarium.

16. *R. levigata*. Smooth Rudbeckia. Pursh n. 3.—“Quite smooth all over. Stem polished, panicled. Branches corymbose. Stalks elongated, single-flowered. Leaves ovato-lanceolate, pointed at each end, triply ribbed, polished, nearly entire. Scales of the calyx lanceolate, the length of the rays.”—Found by Mr. Lyon, in Georgia. Perennial. The leaves have occasionally one or two teeth. Rays pale yellow, short. In Mr. Lambert’s herbarium. Pursh.

16. *R. amplexifolia*. Stem-clasping Rudbeckia. Jacq. Coll. v. 5. 155. Ic. Rar. t. 592. Willd. n. 7. Ait. n. 7. Pursh n. 2. (*R. perfoliata*; Cavan. Ic. v. 3. 27. t. 252.)—Leaves elliptic-oblong, heart-shaped at the base, naked, rough-edged; the lower ones serrated. Stem smooth, striated. Disk nearly cylindrical.—Native of Lower Louisiana, on the banks of the Mississippi, flowering in July and August. We had a specimen, in 1793, from the garden of Mr. Salisbury, who received seeds the preceding year, said to have been collected by Michaux, in New Orleans. The root is annual. Stem erect, branched, round, leafy, about two feet high. Leaves of a pale glaucous green, acute, alternate, reticulated with veins, very smooth, except at the edge, which is beset with minute close prickles. Flowers solitary, at the summit of each branch, erect, with broad, dependent, deep yellow rays, each terminating in two or three blunt teeth; and an elongated, obtuse, dark green or blackish disk.

17. *R. purpurea*. Purple Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 8. Ait. n. 8. Pursh n. 1. Curt. Mag. t. 2. Chrysanthemum americanum, daronici folio, &c.; Pluk. Phyt. t. 21. f. 1. Catesb. Carol. v. 2. t. 59.)—

Leaves rough, ovate, tapering at the base, undivided, toothed; the upper ones lanceolate, entire. Rays very long, pendulous, cloven.—On the mountains from Virginia to Florida, flowering from August to October. Pursh. This elegant and hardy perennial plant has been more than a century in our gardens. It thrives best in a rich moist soil, and is propagated by parting the roots. The stems are three or four feet high, erect, round, striated, smooth, mostly purplish. Leaves triply ribbed, near a span long, rough and harsh to the touch; the lower ones on long stalks. Flowers terminal, solitary, very large, and of a beautiful, as well as singular, aspect; the disk obtusely conical, brown, beset with the long, prominent, rigid, spinous scales of the *receptacle*; radius of numerous, linear-lanceolate, pink or light crimson florets, each three inches long, pendulous, acute and cloven at the extremity. Mr. Curtis observes that the seeds are rarely perfected here, nor do the roots increase very fast. Linnæus has strangely erred, in referring to this species, Miller’s yellow-flowered figure, which belongs to *R. hirta*; see n. 8.

R. angustifolia, Linn. Sp. Pl. 1281. Willd. n. 9, proves the very same plant with *Helianthus angustifolius* of the same authors.

R. oppositifolia, Linn. Sp. Pl. 1280, is, according to Mr. Pursh, the same as *Helianthus laevis*, Linn. Sp. Pl. 1278, and *Silphium solidaginoides*, ibid. 1302. Perfoon has established it as a new genus, by the name of *Helioopsis laevis*, and he is followed by Pursh, p. 563. The leaves do not answer to the specific name, being rough with bristly warts.

R. alata, Jacq. Ic. Rar. t. 593, is *Helenium quadridentatum*, Willd. Sp. Pl. v. 3. 2121. Pursh 560. See HELENIUM.

RUDBECKIA, in Gardening, contains plants of the herbaceous, biennial, and perennial kinds, of which the species cultivated are, the broad jagged-leaved rudbeckia (*R. laciniata*); the narrow jagged-leaved rudbeckia (*R. digitata*); the hairy rudbeckia (*R. hirta*); the purple rudbeckia (*R. purpurea*); the narrow simple-leaved rudbeckia (*R. angustifolia*); and the three-lobed rudbeckia (*R. triloba*).

Method of Culture.—All the sorts of these plants may be increased by off-sets, parting the roots and seeds. The off-sets in the perennial sorts should be taken off, and planted out in the early autumn: when the stems decay, the roots may also be divided, and planted out at the same time, or in the early spring months. And as these plants are often liable to go off soon, some should be frequently raised to keep up the stock; and others have a tendency to become biennial, and decay without increasing the root: they should have the flower-stems cut down in the early summer, to encourage the growth of the root off-sets, for slipping in the following autumn.

However, all the sorts may be raised from seed, and the biennial sorts must always be raised annually in that way; likewise such of the perennial kind as are biennially inclined, sowing the seeds in April, in a border of light earth, raking them in; and when the plants are two or three inches high, pricking them out in nursery-rows till autumn, then planting them out where they are to remain. They should have a light dry soil, and rather warm situation. They all afford much ornament and variety in the borders and clumps, among other flowering plants.

RÜDDER, in Navigation, a piece of timber turning on hinges in the stern of a ship; and which opposing sometimes one side to the water, and sometimes another, turns or directs the vessel this way or that.

The rudder becomes gradually broader, in proportion to its

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its distance from the top, or to its depth under water. The back, or inner part of it, which joins to the stern-post, is diminished into the form of a wedge through its whole length, so as that the rudder may be the more easily turned from one side to the other, where it makes an obtuse angle with the keel. The hinges, which are bolted round the stern-post to the after-extremity of the ship, are called *googings*, and are furnished with a large hole on the after-part of the stern-post. The other parts of the hinges, which are bolted to the back of the rudder, are called *pinles*, being strong cylindrical pins, which enter into the googings, and rest upon them. The length and thickness of the rudder are nearly equal to those of the stern-post. The rudder is turned upon its hinges, by means of a long bar of timber, called the *tiller*, which enters nearly in an horizontal direction into the ship, passing under the upper or middle deck transom; and its operation is directed by the tiller-rope, which in large vessels is wound about a wheel. (See *TILLER*.) The power of the rudder is reducible to that of the lever, and the oblique action of the water upon it is to be determined by the resolution of forces.

In order to explain the action of the rudder on the ship, it should be considered that if, instead of leaving the rudder exactly in a right line with the keel, so as to be a kind of prolongation of it, it be turned to one side or the other, as *BD* (*Plate IV. Navigation, fig. 4.*), it receives an immediate impulse from the water, which glides along the ship's bottom, in running aft from *A* to *B*; and this fluid impels it towards the opposite side, while it continues in that situation, so that the stern, to which the rudder is confined, receives the same movement; and the ship receiving an impulse sideways, her stern turns accordingly from *B* to *b*, on any point whatever *C*, while her head passes from *A* to *a*. It must be observed, that the water strikes the rudder obliquely, and only with that part of its motion which acts according to the sine of incidence, in impelling it in the direction *NP*, with a force which depends not only on the rapidity of sailing, but also on the greatness of the sine of incidence; a force which is consequently in the compound ratio of the square of the greater or less velocity of the ship's motion, and of the square of the larger or smaller sine of incidence, which depends upon various circumstances. So that, if the vessel runs three or four times more swiftly, the absolute shock of the water upon the rudder will be nine or sixteen times stronger under the same angle of incidence, and will be augmented in a greater proportion, if the sine of incidence be increased. This impulsion, or, what is the same, the power of the helm, is always very feeble, when it is compared with the whole weight of the vessel; but it acts with a very long arm of a lever, which occasions it to work very advantageously in turning the ship; for the helm is fixed at a very great distance from the centre of gravity *G*, as well as from the point *C*, upon which the ship is supposed to turn, with respect to the point of percussion *B*; and if the direction *PN* of the impression of the water upon the rudder be prolonged, it is evident that it will pass perpendicularly at the point *R*, widely distant from the centre of gravity *G*; therefore the absolute effort of the water is very powerful. It is not therefore surprising, that this machine impresses the ship with a considerable circular movement, by forcing the stern from *B* to *b*, and the head from *A* to *a*, and even much farther, when the velocity of the ship is preserved; because the effect of the helm always keeps pace with the rapidity of the ship's way.

Amongst all the obliquities which may be given to the rudder, there is one situation which is more favourable than

any of the others, to make it produce with more rapidity the effect of turning the ship, in order to change her course. To be convinced of this, we have only to consider that, if the obtuse angle *ABD* (*fig. 4.*) were to be lessened, the impulse of the water on the rudder would augment, at the same time that it would more oppose the sailing of the ship, since the angle of incidence would be more open, and would present a greater surface to the shock of the water, by opposing its passage more perpendicularly: but then the direction *NP* of the effort of the helm upon the ship would pass at a smaller distance from the centre of gravity *G* towards *R*, and would less approach the perpendicular *NL*; according to which, it is absolutely necessary that the power should act with greater effect to turn the ship. Therefore, it is evident, that, if the obtuse angle *ABD* were too much lessened, the greater shock of the water could not counterbalance the loss occasioned by the distance between the direction *NP* and *NL*, or by the great obliquity which would be given to the same direction *NP* of the absolute effort of the helm with the keel *AB*. If, on the other hand, the angle *ABD* were made more obtuse, the direction *NP* of the effort of the rudder would become more advantageous to turn the ship, since it would approach more the perpendicular *NL*, and since the prolongation of *NP* would augment *GR*, by passing at a greater distance from the centre of gravity *G*. But the rudder would then be struck too obliquely; for the angle of incidence would be more acute; so that it would only present a small part of its breadth to the shock of the water, and would of course receive but a faint impulsion. All this proves that the greatest distance *GR* from the centre of gravity *G* will not counterbalance the too great obliquity of the shock of the water. Whence it must be concluded, that when the water strikes the rudder too obliquely, or too perpendicularly, a great deal of the impulsion, or of the effect it should produce, is lost. Therefore, between these two extremes, there is a middle position, which must be the most favourable.

The diagonal *NP* of the rectangle *IL* (*fig. 4.*) represents the absolute direction of the effort of the water upon the rudder: *NI* expresses the portion of this effort which opposes the ship's head-way, or which forces her a-stern in the direction of the keel. It is easy to perceive that this portion *NI* of the whole power of the helm contributes little to turn the vessel; for, if *IN* were prolonged, it would be seen that its direction passes at a very small distance *GV* from the centre of gravity *G*, and that the arm of the lever *BN = GV*, to which the force is as it were affixed, is at most equal only to one half of the breadth of the rudder. But it is not so with respect to the relative force *NL*, which acts perpendicularly to the keel. If the first force, *NI*, is almost useless, and even hurtful, by retarding the velocity; the second, *NL*, is capable of a very great effect, since it is applied at a great distance from the centre of gravity *G* of the ship, and acts on the arm of a lever *GE*, which is very long. Thus it appears, that, between the two effects *NL* and *NI*, which result from the absolute effort *NP*, there is one which is always opposing the ship's head-way, contributing but little, therefore, to the motion of her turning; whilst the other alone produces that movement of evolution, without retarding her velocity.

As to the most advantageous angle made by the helm, with the line prolonged from the keel, geometricians have fixed it at $54^{\circ} 44'$ (See *DYNAMICS, MECHANICS, and WINDMILL*.) But it has been said, that, in determining

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this angle, they have presumed that the ship is as narrow at her floating line, or at the line described by the surface of the water round her bottom, as at the keel; whereas all vessels increase in breadth from the keel upward to the extreme breadth, where the floating line, or the highest water-line, is terminated; and, therefore, the angle above stated is too large. For the rudder is impressed by the water, at the height of the floating line, more directly than at the keel, because the fluid exactly follows the horizontal outlines of the bottom; so that a particular position of the helm might be supposed necessary for each different incidence which it encounters from the keel upwards. But as a middle position may be taken between all these points, it will be sufficient to consider the angle formed by the sides of the ship, and her axis, or the middle line of her length, at the surface of the water, in order to determine afterwards the mean point, and the mean angle of incidence. The angle $54^{\circ} 44'$, it is said, is too open, and very unfavourable to the ship's head-way, because the water acts upon the rudder there with too great a sine of incidence, as being equal to that of the angle which it makes with the line prolonged from the keel below; but above, the shock of the water is almost perpendicular to the rudder, because of the breadth of the bottom, or that of the ship's sides. If then the rudder is only opposed to the fluid, by making an angle of 45° , or $45^{\circ} 1'$, with the line prolonged from the keel, the impression, by becoming weaker, will be less opposed to the ship's head-way, and the direction NP (*fig. 4.*) of the absolute effort of the water upon the rudder, approaching nearer to the lateral perpendicular NL, will be placed more advantageously, since the prolongation of the absolute effort passes at a greater distance GR from the centre of gravity of the ship. To which it is added, that experience daily testifies, that a ship steers well, when the rudder makes the angle DBE no more than 35° . If this angle be made 45° , and the absolute effort NP be decomposed, we shall have NI equal to the other side NL of the same square; so that the part of the whole power which opposes the head-way of the ship would be only equal to that which produces the movement of rotation; instead of which, if DBE were $54^{\circ} 44'$, NI would become much greater than NL, in proportion to the sines of the angles which are opposed to them in the triangles PIN or PLN, and the ship would lose much more of her velocity than in the first situation of the rudder, which is thought to be best adapted to vessels in general, subject, however, to occasional alteration, as they shall make an angle more or less open with their sides a-stern. Hence it has been concluded, as a general position, that the most advantageous angle will always be found between 35° and 45° . From Bouguer's treatise (*ubi infra*), it appears, that, in most ships, the angle of the rudder with the prolonged line of the keel should be $46^{\circ} 40'$. L. Euler recommends an obliquity somewhat less than $54^{\circ} 44'$, for the greatest action of the rudder; and establishes this rule, that an obliquity of about 48° will, in general, produce the best effect.

Those who duly consider the action of the *helm* and *tiller* (for an account of which, see those articles) will easily conceive, that the greater the ship's velocity is, the more powerful is the action of the rudder, since it acts against the water with a force which increases as the square of the velocity of the fluid, whether the ship has head-way, or stern-way; observing always, that in these two circumstances the effects are contrary; for, if the ship goes a-stern, the rudder will be struck from I to N (*fig. 4.*); and, instead of being pushed from N to P, it will be so from N to R; so that the

stern being moved in the same direction, the head will take a contrary one, and move towards the same side as the tiller BF.

It should be observed, in the use of the rudder, that there is one part of its effort which impedes the ship's sailing, when it is struck by the water which runs rapidly along the ship's bottom. If it makes an angle of 45° with the keel prolonged, it receives only half the impulsion it would, if acted upon perpendicularly; because the absolute impulse diminishes from two causes. The surface which opposes the shock of the water is reduced to a less extent than it was at first, and the angle of incidence diminishes likewise; so that by this, the impulse has diminished one half. Considering next the impulsion NP, which remains (*fig. 4.*), it will appear that there is only one part NI which is opposed to the sailing, and which is less than NP, in the proportion as the sine total is to the sine of 45° , the measure of the angle of incidence VNB equal to NPI; for the angle VNL is right, as well as the angle PNB; so that, if you take away the common angle LNB, the two angles PNL and VNB will remain equal between themselves; but, as the angle IPN is equal to its alternate angle PNL, it follows that IPN is always equal to VNB, whether the angle made by the rudder be more or less open with the keel prolonged. So that, if the surface of the rudder which receives the shock be 80 feet square superficies, it will first be reduced, by its being exposed to the course of the fluid, to an effort of 40 feet surface, then to 28 or 29; because, in the first place, there is only one part of the velocity of the water which contributes to the shock, and that is proportional to the relation of the square of the sine total to that of the sine of incidence; and, secondly, because out of the absolute impulse NP, which results from this last oblique shock, there is only a part NI which opposes the velocity of the ship proportional to the absolute force NP, in the same relation as there is between the sine total and the sine of incidence; that is to say, that when the rudder makes, in the largest ships, an angle of 45° , it impedes the ship's rapidity of sailing, in the direction of the keel, with an effort NI, equivalent to the impulsion which a surface of 28 or 29 feet square might receive, if it were exposed perpendicularly to the shock of the water. So that, if the ship sails 12 knots an hour, or 19 feet a second, the effort of the rudder NI, which opposes the ship's way, will be 12,499 or 12,945 pounds; salt water weighing $\frac{1}{15}$ th more than fresh.

It follows, from all that has been said of the rudder, that it ought to be employed as little as possible; that is to say, the ship and her sails ought to be so disposed, that the smallest motion of this machine may bring her to her course, if she deviates from it, or make her perform any evolution which may be thought proper.

The ingenious writer of the article *Seamanship* in the Enc. Brit. suggests, that the theory of M. Bouguer and some other French mathematicians is founded on principles that are erroneous. They assume, as we have above supposed, that the impulse of a fluid is in the proportion of the square of the sine of the angle of incidence; and also that its action on any small portion, such as a square foot of the sails or hull, is the same as if that portion were detached from the rest, and were exposed, single and alone, to the wind or water in the same angle. Both these principles, it is affirmed, are erroneous; and the error is very considerable in cases which most frequently occur in practice, that is, in the small angles of inclination. The error of this theory, especially in cases of great obliquity, may be seen in the following

following table: in which the first column exhibits the angle of incidence; the second, the impulsions really observed; the third, the impulses, if they had followed the duplicate ratio of the sines; and the fourth, the impulses according to the simple ratio of the sines.

Angle of Incidence.	Impulsions observed.	Impulses in dupl. Ratio of Sines.	Impulses in simple Ratio of Sines.
90	1000	1000	1000
84	989	989	995
78	958	957	978
72	908	905	951
66	845	835	914
60	771	750	866
54	693	655	809
48	615	552	743
42	543	448	669
36	485	346	587
30	440	250	500
24	424	165	407
18	414	96	309
12	406	43	208
6	400	11	105

The error in the second principle of the theory is still greater, and the action on one part of the sail or hull is so greatly modified by its action on another adjoining part, that a stay-sail is often seen hanging like a loose rag, although there is nothing between it and the wind; and this merely because a great sail in its neighbourhood sends off a lateral stream of wind, which completely hinders the wind from getting at it. Till the theory of the action of fluids be established, therefore, we cannot tell what are the forces which are acting on every point of the sail and hull: therefore we cannot tell either the mean intensity or direction of the whole force which acts on any particular sail, nor the intensity and mean direction of the resistance to the hull; circumstances absolutely necessary for enabling us to say what will be their energy in producing a rotation round any particular axis. In like manner, we cannot, by such a computation, find the spontaneous axis of conversion (see ROTATION), or the velocity of such conversion. In short, we cannot pronounce with tolerable confidence *a priori* what will be the motions in any case, or what dispositions of the sails will produce the movement we wish to perform. The experienced seaman learns by habit the general effects of every disposition of the sails; and though his knowledge is far from being accurate, it seldom leads him into any very blundering operation. Perhaps he seldom makes the best adjustment possible, but seldom (still does he deviate very far from it; and in the most general and important problems, such as working to windward, the result of much experience and many corrections has settled a trim of the sails, which is certainly not far from truth, but (it must be acknowledged) deviates widely and uniformly from the theories of the mathematician's closet. The honest tar, therefore, must be indulged in his joke on the useless labours of the mathematician, who can neither hand, reef, nor steer.

Bouguer *Traité de la Manœuvre des Vaisseaux*. Falconer's *Marine Dict. art. Helm*; and Euler's *Complete Theory of the Construction and Properties of Vessels*, translated by Mr. Watson, 1776, book ii. chap. vii. viii. ix.

A narrow rudder is best for a ship's sailing, provided she can feel it, that is, be guided and turned by it; for a broad rudder will hold much water when the helm is put over to

any side; but if a ship have a fat quarter, so that the water cannot come quick and strong to her rudder, she will require a broad rudder.

The aftmost part of the rudder is called the *rake* of the rudder.

Large canal boats have *clasp-rudders*, about half their length being moveable on hinges, so as to fold and shorten them before the entering of a lock.

RUDDER-Coats, are coverings made of well-tarred canvas, to prevent the water from running in at the rudder-hole.

RUDDER-Irons, in a *Ship*, are the cheeks of that iron of which the pintle is part, which is fastened and nailed down about the rake of the rudder.

RUDDER-Pendants. See PENDANTS.

RUDDER-Rope. See ROPE.

RUDDER-Tackle. See TACKLE.

RUDDIMAN, THOMAS, in *Biography*, was born in the parish of Boyndie, Banffshire, in the year 1674, where he received the first rudiments of his education, and in 1690 he was sent to King's college, Aberdeen, where he obtained a burfary. He took the degree of M. A. in 1694, and in the following year he was elected master of the public school of Laurence-Kith. In 1700 he removed to Edinburgh, and two years afterwards he was appointed librarian to the faculty of advocates. In 1709 he published Johnson's metrical paraphrase of Solomon's Song, and soon after he added a very accurate glossary to the folio edition of Gavin Douglas's translation of the *Eneid*. His situation at the advocates' library was so favourable to his literary pursuits, that he declined an invitation from the magistrates of Dundee, to the office of rector of the grammar-school in that town. In 1714 he published his "*Rudiments of the Latin Tongue*," which became a very popular book in Scotland, and was used in many schools in South Britain. In 1725 he edited "*Buchanani Opera omnia*," in two vols. folio, to which he added notes critical and explanatory. About the same time he commenced the business of printer, in conjunction with his brother Walter. In 1720 he published the first part of his "*Grammaticæ Latinæ Institutiones*," which was very soon followed by his "*Grammatical Exercises*." Of the various works which issued from the press of the Ruddimans, the most important were the "*Greek Testament*," and an edition of the works of Livy: the last is reckoned an extremely correct edition. He also edited Anderson's "*Diplomata et Numismata Scotiæ*," to which he prefixed a learned preface. He exhibited great critical acumen in his vindication of "*Buchanan's Version of the Psalms*," against the objections of Mr. Mann, and by "*Critical Observations on Burrman's Commentary on Lucan's Pharsalia*." Some treatises on disputed points of Scottish history involved him in controversies, in which he met with much abuse, but he did not lose his own temper, though he was a warm advocate for the national independence of Scotland, and much attached to the house of Stuart. At an advanced age his eye-sight began to fail him, and he resigned the office of librarian to the faculty of advocates in 1752. He died in January 1757, at the age of 83. Chalmer's *Life of Ruddiman*.

RUDDOCK, in *Ornithology*, an English name for the *rubecula*, more commonly known by the name of the *red-breast*, or *robin-red-breast*.

RUDELSHOFEN, in *Geography*, a town of Germany, in the margraviate of Anspach; four miles E. of Uffenheim.

RUDELSTADT, a town of Silesia, in the principality of Schweidnitz; 16 miles W. of Schweidnitz. N. lat. 50° 42'. E. long. 15° 59'.

RUDEN,

RUDEN, a small island in the Baltic, near the coast of Pomerania, amidst shoals and sand-banks, which render it probable that it was formerly much larger; and this conjecture is confirmed by another circumstance, *viz.* that in the year 1264 it had two church-villages, called "Ruden" and "Carven." On this island is a castle; and between it and the little island of Die is a sand eight miles long and two broad. N. lat. 53° 40'. E. long. 13° 48'.

RUDEN, or *Tydal*, a mountain which separates the province of Jamptland in Sweden, from the province of Drontheim in Norway.

RUDENHAUSEN, a town of Germany, in the county of Castell; 28 miles W.S.W. of Bamberg.

RUDENTURE, in *Architecture*, the figure of a rope, or staff, sometimes plain, sometimes carved; with which a third part of the fluting of columns is frequently filled up.

It is thus called from the Latins *rudens*, *cable*, whence some call it a cabling; and the columns, whose flutings are thus filled, they call *rudented*, or *cable columns*.

There are also rudentures in relief, laid on the naked of pilasters, not fluted; an instance of which we have in the church of St. Sapienza at Rome.

RUDERATION, **RUDERATIO**, in *Building*, a term used by Vitruvius for the laying a pavement with pebbles, or little stones.

To perform the ruderation, it is necessary the ground be first well beaten, to make it firm, and to prevent its cracking. Then a stratum of little stones is laid, to be afterwards bound together with mortar, made of lime and sand, called by Vitruvius *statumen*.

If the sand be new, its proportion to the lime may be as three to one; but if dug out of old pavements, or walls, as five to two.

RUDERATION, Daviler observes, is used by Vitruvius, lib. vii. cap. 1. for the coarsest and most artless kind of masonry; where a wall is, as it were, cobbled up.

RUDGELEY, in *Geography*, a market-town in the parish of Rudgeley, east division of the hundred of Cuttlestone, county of Stafford, England, is situated on the south bank of the river Trent, at the distance of 9½ miles E.S.E. from the town of Stafford, and 131½ miles N.W. by N. from London. It has been long celebrated on account of its great annual fairs for horses, particularly those of the coach breed. The market day is Tuesday, weekly; and the fairs are held on the 6th of June and 20th of October. The church, which stands on the north side of the town, is not remarkable as a building, but it contains several handsome monuments to the memory of the Chetwynd and Weston families. The living is a vicarage in the patronage of the dean and chapter of Lichfield.

The ancient owners of Rudgeley were of the same name with the town, and seem to have continued in possession till the reign of Henry VI. In the time of Edward III. some of the family were sheriffs of the county; and one was a knight of the shire during the same period. Erdeswick states that this manor subsequently belonged to the bishops of Lichfield, and was alienated by bishop Sampson to the crown in 1547.

On the opposite bank of the Trent from Rudgeley, are several villages named Ridwane, and distinguished from each other by the adjunct Hamfall, Pipe, and Mavefyn or Malveyfin. Of these, the last is the most important; and its church is interesting to the antiquary, on account of the numerous ancient monuments it contains in memory of the Mavefyns, lords of the manor, several of whom were military characters of considerable eminence. Hugo Mavefyn, the founder of the church, is represented by a stone figure

in chain armour, armed and equipped for battle, lying under a pointed arch in the north wall of the church. Adjoining, under another similar arch, is the recumbent figure of sir Henry Mavefyn, a knight crusader. Like his predecessor, he appears completely armed, and dressed in chain mail; but differs from him in having his legs crossed, and his shield charged with cross bars. The other tombs are altar-shaped, and are situated in the middle of the church. That of sir Robert Mavefyn recalls to memory a melancholy story, thus related by Mr. Pennant: "In the beginning of the reign of the usurping Henry, when the kingdom was divided against itself, two neighbouring knights, sir Robert Mavefyn, and sir William Handfacre, of Handfacre, took arms in support of different parties: the first to assert the cause of Bolingbroke; the last that of the deposed Richard. They assembled their vassals, and began their march to join the armies, then about to commence battle near Shrewsbury. The two neighbours, with their respective followers, unfortunately met not far from the seats. Actuated by violent party rage a skirmish ensued: sir William was slain on the spot. What a picture is this of the misery of civil dissension? What a tale the following of the sudden vicissitude of hatred to love, between contending families? Margaret, one of the daughters, and coheirs, of sir Robert Mavefyn, gave her hand to sir William, son of the knight slain by her father, and with her person and fortune compensated the injury done by her house to that of Handfacre."

About two miles to the north-west of Rudgeley, close to the river Trent, stand the church and village of Colwich. The first is very ancient, and is prebendal to the cathedral of Lichfield. Here are several tombs in memory of the Ansons, ancestors of the present lord Anson; also of the Wolfelys, proprietors of Wolfely park, which is situated on the southern bank of the Trent, and displays much fine and picturesque scenery. Cannock chace, which extends to the southward, and contains an area of nearly forty miles square, was formerly a forest, but has been long stripped of its foliage, and is now a heathy waste, only remarkable for the extensive prospects it affords, and for its richness in coal-mines. On its eastern boundary is Beaufort park, the princely seat of the earl of Uxbridge, which is placed on the declivity of a lofty sloping eminence, sheltered on all sides by "beautiful rising grounds, embosomed with trees, and commanding in front, over the tops of far subjacent woods, a most extensive and diversified view; so that it well vindicates the propriety of its name." The house was erected in the reign of queen Elizabeth, by Thomas, second lord Paget. It is a handsome structure of stone, built in the form of a half H, and has been of late years greatly improved by its noble owner. On the summit of the hill on which it is situated, may be seen the remains of an ancient British post, called Castle-hill. It is formed by two deep ditches, and an immense rampart, and has one entrance on the east and another on the west. Near the base of the hill on its east side, stands the village of Fairwell, the church of which was formerly attached to a priory of Benedictine nuns. Originally it was the property of canons regular, or hermits, but at the request of several of the brethren it was bestowed on the nunnery in 1140, by Roger de Clinton, bishop of Lichfield, who further endowed it with considerable possessions. King Henry II. was likewise a great benefactor to this society. Pennant's Journey from Chester to London, 4to. Lond. 1782. The History and Antiquities of Staffordshire, &c. by the Rev. Stebbing Shaw, B. D. F. S. A. vol. i. fol. Lond. 1798.

RUDHAN, a town of Persia, in the province of Kerman; 60 miles N.W. of Sirgian.

RUDIARIUS, in *Antiquity*, a veteran gladiator, who had got a discharge from the service.

He was thus called, because, as a mark of dismissal, a rod was put into his hands, called *rudis*; which see.

The *rudarii* were also called *spectatores*.

RUDIMENTS, **RUDIMENTA**, the first principles, or grounds, of any art or science, called also the elements thereof.

RUDIS, a knotty, rugged stick, which the prætor, among the Romans, gave the gladiators, as a mark of their freedom and dismissal.

The *rudis* seems to have been bestowed both on slaves and freedmen; with this difference, that it procured for the former no more than a discharge from any farther performance in public, upon which they commonly turned *lanista*, spending their time in training up young fencers; but the latter, who had hired themselves out for these shows, were restored to a full enjoyment of their liberty. Kennet, Rom. Ant. p. 280.

Hence the Latin phrase, *rude donare*, to make a gladiator free, to discharge him from fighting any more. They were hence called *rudarii*, and had a custom of hanging up their arms in the temple of Hercules, the patron of their profession, and were never called out again without their consent.

RUDISHEIM, in *Geography*, a town of Germany, in the Rhingau, celebrated for its wine; 19 miles W. of Mentz.

RUDKIOPING, a sea-port town of Denmark, on the W. coast of the island of Langeland, and the only town in the island; the inhabitants carry on a considerable trade in corn and provisions. N. lat. $54^{\circ} 37'$. E. long. $10^{\circ} 45'$.

RUDMAS DAY, in our *Old Writers*, the feast of the Holy Cross. There are two of those feasts, one on the third of May, being the Invention of the Cross; and the other the fourteenth of September, called *Holy Rood-day*, and is the Exaltation of the Cross.

The word is compounded of the Saxon *rode*, i. e. *crux*, and *mas-day*, i. e. *feast-day*.

RUDNA, in *Geography*, a town of Hungary; 12 miles N.N.W. of Kemptz.

RUDNIK, a town of Servia; 40 miles N.N.E. of Jenibafar.

RUDNIKI, a town of Lithuania, in the palatinate of Wilna; 15 miles S.S.W. of Wilna.

RUDNIKZA, a town of European Turkey, in Servia; 46 miles S. of Belgrade.

RUDOLFSOWITZ, a town of Silesia, in the lordship of Plefz, on the Biela; three miles S.E. of Plefz.

RUDOLFSTEIN, a town of Germany, in the principality of Culmbach; five miles N.W. of Hof.

RUDOLFWERTH, **NEUSTADTEIN**, or *Novomesto*, a town of Austria, in the duchy of Carniola, situated on the Gurk, and founded in the year 1365, by the Austrian archduke Rodolph IV. privileged, and called after his own name. It has a provostship or collegiate church, erected in the year 1509, four other churches, and two convents. By incursions of the Turks in the fifteenth and sixteenth centuries, successive fires, and the plague, this town has been very much reduced from its former flourishing condition; 44 miles S.S.W. of Pettau. N. lat. $45^{\circ} 52'$. E. long. $15^{\circ} 41'$.

RUDOLPHIA, in *Botany*, a genus established by Willdenow, in the Transactions of the Society *Natura Scrutatorum* at Berlin, v. 3. 151, is named in honour of Charles Asmund Rudolph, a German physician, the author of some botanical observations. Such at least is the account of De

Theis, taken probably from the above publication, which we have not seen. The genus may also serve as a memorial of John Henry Rudolph, author of an inaugural dissertation on such plants of the *Flora Jenensis*, as belong to the *Polyandria Monogynia* of Linnæus; see *Dryandr. Bibl. Banks.* v. 3. 161.—Willd. Sp. Pl. v. 3. 918. Poirer in Lamarck Dict. v. 6. 331.—Class and order, *Diadelphica Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Ess. Ch. Calyx two-lipped. Standard of the corolla very long, lanceolate. Stamens all connected. Legume flat, with many seeds.

1. *R. volubilis*. Twining Rudolphia. Willd. n. 1.—“Leaves ovate, pointed; heart-shaped at the base, and somewhat peltate.”—Native of very lofty mountains, in the West Indian island of Porto Rico. The stem is shrubby, without prickles, twining up the trunks of trees; its bark black and warty; the young branches downy. Leaves simple, alternate, stalked, rigid, entire; shining on the upper side; downy when young. Footstalks with two joints, channelled between them, on the upper side. Clusters scattered, thrice the length of the leaves. Flower-stalks three together. Flowers scarlet. Willdenow.

2. *R. peltata*. Peltate Rudolphia. Willd. n. 2. (*Erythrina planifolia*; Linn. Sp. Pl. 993. *Coraliodendron folio singulari oblongo, filiquâ planâ*; Plum. Ic. 92. t. 102. f. 1.)—Leaves oblong-lanceolate, somewhat heart-shaped, peltate.—Native of Hispaniola. Willdenow asserts this to be distinct from the foregoing. The common flower-stalk, as represented by Plumier, is a foot and half long, racemose at the extremity.

M. Poirer reduces to this genus the *Butea* of Koenig, and we heartily wish we could follow him, in order to get rid of a name so absurd and reprehensible in its original application; see **PLASO** and **BUTEA**. We fear however that neither the character of the legumes, nor the habits of the plants, will support such a measure.

RUDOLPHINE TABLES. See **CATALOGUE of the Stars**.

RUDOLSTADT, or **RUDELSTADT**, in *Geography*, a town of Germany, in the county of Schwartzburg Rudolstadt, from which a branch of the house of Schwartzburg derives its title, situated on the Saal; 24 miles S.E. of Erfurt. N. lat. $51^{\circ} 40'$. E. long. $11^{\circ} 19'$.

RUDRA, in *Mythology*, a name of the Hindoo deity Siva. In some of their theogonical books, Siva, in the form of Rudra, is made to spring from a wrinkle in the forehead of Brahma, with five heads and ten arms, as he is represented in the plates of the Hindoo Pantheon. When five-headed, he is named Pancha-muki. (See that article.) Rudra is said to have thus sprung into a new form, to enable Brahma to people the world with suitable inhabitants; his earlier efforts having been productive of a refractory race. (See **MUNI**.) The name of Rudra is generally applicable to Siva, in his character of Fate and Destiny, and of Time. Under the article **MAHAKALA** he is called Kal-Agni-Rudra, interpreted Time, Fire, Fate, and designative of his destructive energies. (See **KAL-AGNI-RUDRA**.) In the Institutes of Menu, (see **MENU**.) the “eleven Rudras” are mentioned, but it has not been explained what that number especially adverts to. Rudra is understood to be the deity of pregnant women, as is his consort, known as such in her character of Rudri, or Rudrani. (See **RUDRANI**.) He is also called the god of tears and lamentation: being, as time or fate, the lord of punishment, and thereby causing these results. Sometimes he is called Maha Rudra, or the great Rudra. This occurs in an extract in the article **KAMA**.

RUDRANI, or **RUDRI**, is a name and form of the goddess

goddess Parvati, considered then as the fakti or energy of her lord Siva, in his form of Rudra. (See those several articles; also RAUDRI.) In this character she is sometimes called the patroness of pregnant women. (See IDITA, ILITA, and LITHYA.) She is invoked under the appellation of "Rudrani the beloved of Siva," in the article LAKSHMI of this work.

RUDSTAKES, in *Agriculture*, a provincial term applied to the stakes to which cattle are tied in the stall.

RUDTSDORF, in *Geography*, a town of Bohemia, in the circle of Chrudim; nine miles E. of Leutmischl.

RUE, PIERRE DE LA; in *Biography*, an ecclesiastical composer in the first stage of correct counterpoint. He was contemporary with Josquin, and one of the composers for the papal chapel during the pontificate of Sixtus IV. who reigned from 1471 to 1484. De la Rue, or as he is called by writers in Latin, Petrus Platenfis, was one of the most voluminous composers of this early period. What country gave him birth, is now difficult to ascertain; Walther calls him a Netherlander; Glareanus, a Frenchman; others suppose him to have been a Spaniard. It is, however, certain that he was in high favour with prince Albert, and princess Isabella, of the Low Countries; that a work under his name was published at Antwerp, with this title: "El Parnasso Espanol de Madrigales y Villancicos à quatro, cinco y seis voces;" besides masses and motets to Latin words; and that he was a very learned contrapuntist.

Many of his compositions for the church are still extant in the museum collection of masses and motets, some of which were published as early as the year 1503, immediately after the invention of musical types.

RUE, CHARLES DE LA, a learned French Benedictine monk, was born at Corbie, in Picardy, in the year 1684. He took the vows at the age of 19, in the abbey of Meaux, having already given evidence that he possessed a studious disposition, by the progress which he had made in the languages, and in the belles lettres. In 1712 the learned Montfaucon admitted him into his friendship, became the guide of his studies, and freely communicated to him the stores of knowledge which he possessed. So well did the pupil avail himself of these advantages, that he soon became a very useful assistant to his master in his learned labours. In 1713, Montfaucon had published the remains of Origen's "Hexapla," and de la Rue was fixed on to give a complete edition of that learned father's works, with the exception of the Hexapla. In 1733 he published the two first volumes, with proper prolegomena, and many useful as well as very learned notes. The other volumes were published by his nephew Vincent, whom he had associated with himself in his work, after the death of Charles, which happened in 1739. The manner in which the third and fourth volumes of this great work were executed, shews that the nephew was fully adequate to the task confided to him. This edition is entitled "Origenis Opera omnia, quæ Græcè vel Latinè extant, et ejus nomine circumferentur, ex variis Editionibus et Codicibus Collecta, recensita, Latinè versa at Annotacionibus illustrata." Vincent de la Rue died in the year 1762. Moreri.

RUE, in *Botany*. See RUTA.

RUE, in the *Materia Medica*, the ruta graveolens, or common rue, has a strong, ungrateful odour, and a bitter, hot, penetrating taste; the leaves are so acrid as to irritate and inflame the skin, if they be much handled; and in its natural and uncultivated state, it is said to possess these qualities more powerfully. Its virtues are extracted both by water and rectified spirit, but more powerfully by the latter. On inspissating the spirituous tincture, very little of its flavour

rises with the menstruum; most of the active parts of the rue being concentrated in the extract. In distillation with water, an essential oil separates, which is of a yellowish or brownish colour, a moderately acrid taste, and penetrating smell; the decoction, inspissated, yields a moderately warm, pungent, and bitterish extract. The seeds and capsules contain more oil than the leaves. From the experiments of Beaumé it appears, that the recent plant contains but a very small portion of essential oil: thus, from 21 lbs. of the leaves he scarcely obtained a drachm, while 10 lbs. of the seeds yielded two ounces.

Rue was much used by the ancients, who ascribed to it many excellent qualities. Hippocrates commends it as a resolvent and diuretic, and attributes to it the power of resisting contagion, and the action of other kinds of poisons; so that it was employed with this intention by Mithridates (see Plin. N. Hist. l. 28. c. 8.): this quality, though allowed by Boerhaave, is now generally discredited. (Cullen's Mat. Med. vol. ii. p. 365.) According to Bergius, it is "alexiteria, pellens, emmenagoga, sudorifera, rubefaciens." It is, however, acknowledged to be a powerful astringent, and, like other medicines of the fetid kind, to possess attenuating, deobstruent, and antispasmodic powers, and to be peculiarly adapted to phlegmatic habits, or weak and hysterical constitutions, suffering from retarded or obstructed secretions. A strong infusion of it, exhibited per anum, has been found of great service in relieving the convulsions of infants, arising from flatulence and other intestinal irritations. It is employed by some as a tea, and also externally in discutient and antiseptic fomentations. Among the common people, the leaves are sometimes taken with treacle, on an empty stomach, as anthelmintic. A conserve, made by beating the fresh leaves with thrice their weight of fine sugar, is the most commodious form for using the herb in substance. The dose of the powdered leaves may be from grs. xv to ℥j, given twice or thrice a day.

The officinal preparations are *oleum rutæ*, and *extractum rutæ graveolentis*. The "oleum herbæ florescentis rutæ" of the Dublin pharmacopeia, or oil of rue, is procured in the quantity of 59 grains of oil from 21 pounds of rue, which oil has the strong ungrateful odour and taste of the plant. When recently drawn the colour is yellow, but by age it deepens to a brown, and deposits a brownish resinous sediment. It congeals at 40° Fahrenheit. This oil is stimulant, and antispasmodic: it is sometimes given in hysteria, and the convulsive affections of infants attendant on dentition, and is sometimes used as a rubefacient in palsy. The dose is from ℥ij to ℥v, triturated with sugar or mucilage. The "extractum foliorum rutæ graveolentis," Edin. "extractum foliorum rutæ," Dub., or extract of rue, is prepared by the former dispensatory in the same manner as the extract, and by the latter, like other simple extracts: and by whichever process it is prepared, it is inodorous, but has a bitter acrid taste. The medicinal properties are different from those of the plant, the stimulant and narcotic powers of which depend on the volatile oil it contains, which is dissipated during the inspissation of the extract. The dose is from grs. x to ℥j, in pills. Lewis. Woodville. Thompson.

RUE, *Dog's*. See SCROPHULARIA.

RUE, *Goat's*. See GALEGA.

RUE, *Meadow*. See THALICTRUM.

The leaves of meadow-rue, mixed with other greens, are somewhat laxative, according to Dodonæus; but a decoction of the root is more so, and may be well substituted for rhubarb.

RUE, *Wall*, or *White maidenhair*, *ruta muraria*, a species of *asplenium*; which see.

This plant is found growing out of the joints of old walls in various parts of England, where it is gathered for medicinal use; but as it cannot be cultivated in gardens so as to grow to advantage, it is needless to say more of it.

This is one of the five capillary herbs mentioned in the Dispensatory, and has the same virtues with the rest of the maiden-hairs; it is sometimes used in pectoral decoctions and diuretic apozems.

RUE, *Wild Assyrian*. See PEGANUM.

Its virtues agree with the garden rue, but it is more acrimonious.

RUE, in *Geography*, a town of France, in the department of the Somme, and chief place of a canton, in the district of Abbeville; 12 miles N.W. of Abbeville. The place contains 1346, and the canton 9736 inhabitants, on a territory of 332½ kilometres, in 16 communes. The chief trade of this town is in fish, sheep, wool, horses, and cattle.

RUE, a river of Wales, in the county of Montgomery, which runs into the Severn, three miles S. of Wellipool.—Also, a river of France, which runs into the Dordogne, near Bort.

RUE *Ruw*, a town of Switzerland, in the canton of Friburg, capital of a bailiwick; 10 miles W. of Gruyeres.

RUEBLAND, a town of the duchy of Carinthia; six miles S.S.E. of Spital.

RUECCO, a river which rises in Carniola, and runs into the sea a little to the N.E. of Trieste, passing during its short course through immense rocks.

RUEDA, a town of Spain, in the province of Leon; 11 miles E.S.E. of Leon.—Also, a town of Spain, in the province of Leon; 16 miles S.W. of Valladolid.

RUEDOCK. See RUADOCK.

RUELLE, a French term, formerly introduced into our language, is a diminutive of *rue*, *street*, and signifies, literally, *little street*.

Its use, among us, was for an alcove, or other genteel apartment, where the ladies receive visits either in bed or up. The poets go reading their works from ruelle to ruelle, to bespeak the approbation and interest of the ladies. The term, however, is now disused.

RUELLIA, in *Botany*, a genus of Plumier's, named in honour of a French physician and botanist, Dr. John Ruelle, who published, in 1536, a treatise "De Naturâ Stirpium," chiefly a translation of Dioscorides, which is celebrated by Plumier for the excellence of its latinity. Ruelle, though physician to Francis I., quitted the profession of physic, and entered into the church. He died a canon of Paris, in 1537.—Plum. Gen. 12. t. 2. Linn. Gen. 324. Schreb. 423. Willd. Sp. Pl. v. 3. 362. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 56. Pursh 420. Brown. Prodr. 477. Dill. Elth. t. 248 and 249. Juss. 103. Lamarck Dict. v. 6. 337. Illustr. t. 550. Gærtn. t. 54.—Class and order, *Didymania Angiospermia*. Nat. Ord. *Personata*, Linn. *Acanthi*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, permanent, divided, more or less deeply, into five linear, acute, straight, equal, permanent segments. *Cor.* of one petal, somewhat irregular; the upper part of the tube dilated and inclining; limb five-cleft, spreading, obtuse; the two upper segments most reflexed. *Stam.* Filaments four, shorter than the corolla, situated in the dilated part of the tube, approaching each other, and connected, in pairs; anthers scarcely projecting beyond the tube, each with two parallel, simple cells. *Pist.* Germen superior, roundish; style thread-shaped, the length of the stamens; stigma in two acute segments, the

lowermost involute. *Peric.* Capsule nearly cylindrical, pointed at each end, almost sessile, of two cells, and two valves, separating by the elasticity of their taper base. Partition contrary to the valves, and combined with them. *Seeds* several, roundish, compressed, each subtended by an awl-shaped, ascending prop.

Eff. Ch. Calyx in five deep, equal segments. Corolla somewhat bell-shaped, slightly irregular. Stamens approximated in pairs. Anthers of two parallel cells. Capsule of two elastic valves, and two cells; partition from the centre of each valve. Seeds several, with awl-shaped props.

This genus has generally been supposed, by botanists of the Linnæan school, to differ from *Justicia*, merely in having four stamens instead of two. The elastic bivalve capsule, with props to the seeds, was considered as common to both, and very justly; though a few species have been admitted, in which these characters are altogether wanting, as *R. balsamea* and *uliginosa*.

Mr. Brown has investigated *Ruellia* with no less care than *JUSTICIA*, see that article; for indeed a student of tropical plants could not fail soon to discover, that he was able to proceed but a very little way, without understanding these genera, and the family to which they belong. The able botanist just mentioned separates from *Ruellia* all species that have only two seeds in each cell, such as *R. intrusa* of Vahl, and the Linnæan *Justicia gangetica*; and even these, he thinks, require subdivision. Others are to be removed on account of their separate partition, unconnected with the valves of the capsule, like *R. Blechnum*, &c. *R. depressa* belongs, it seems, to a different natural order.

The number of species, which in Willdenow is 46, becomes thus greatly reduced. In the new edition of Hort. Kew. eleven are, under Mr. Brown's inspection, enumerated, two of them not among Willdenow's. Four more are described in his own Prodr. from New Holland. To all these *reptans* of Forster, and probably *secunda* of Vahl, are to be associated, nor is it supposed that several more species may not be found. We shall exhibit these acknowledged ones (only omitting *ringens*; see *HYGROPHILA*), as a specimen of the genus, several of them being much recommended by their beauty. Unfortunately they mostly require the heat of a stove, a few only will succeed with the protection of a green-house, in this country. They are generally perennial herbs; sometimes shrubby.

1. *R. ovata*. Ovate-leaved *Ruellia*. Cavan. Ic. v. 3. 28. t. 254. Willd. n. 4. Ait. n. 1.—Leaves sessile, elliptic-oblong, acute at each end, entire, villous. Flowers axillary, ternate, nearly sessile. Stem decumbent.—Native of Mexico, from whence it was transmitted to the botanic garden at Madrid. The late marchioness of Bute sent it to Kew in 1800. This is a perennial, herbaceous, stove-plant, flowering in July and August. The root is fibrous. Stems scarcely a span long, obscurely quadrangular, leafy, hairy; prostrate at the base; ascending at the extremity. Leaves opposite, near two inches long, soft, downy and fringed. Flowers about the top of the stem, large, longer than the upper leaves, deep blue with a white tube. Stigma, according to Cavanilles, spatulate, undivided.

2. *R. strepens*. Whorled *Ruellia*. Linn. Sp. Pl. 885. Mant. 422. Willd. n. 5. Ait. n. 2. Pursh n. 1. (*R. strepens*, capitulis comosis; Dill. Elth. 330. t. 249.)—Leaves stalked, ovate, acute, entire. Stalks three-flowered, very short. Stem erect.—Native of North America. On dry hills, in shady woods, from Virginia to Carolina, flowering in June and July. *Pursh.* Stem square, with a few short branches. Leaves two inches long, roughish with short scattered hairs. Flowers large, pale blue, making two or

RUELLIA.

three apparent whorls, from the upper leaves. *Braætas* lanceolate, fringed, rising above the *calyx*, whose segments are awl-shaped, very narrow, and hairy, rather longer than the ripe *capsule*.

3. *R. patula*. Spreading Ruellia. Jacq. Misc. 2. 358. t. 119. Willd. n. 6. Ait. n. 3.—Leaves stalked, ovate, entire, very obtuse, downy. Flowers ternate, nearly sessile. Stem much branched, spreading. Capsule above twice the length of the *calyx*.—Native of the East Indies; imported by Sir J. Banks, in 1777. This is a shrubby species, flowering copiously in the stove, in July and August. The leaves are shorter and broader than in the foregoing, rounded, and somewhat heart-shaped. Flowers light blue. *Calyx* small. The whole plant is finely downy.

4. *R. lactea*. White Mexican Ruellia. Cavan. Ic. v. 3. 28. t. 255. Willd. n. 9. Ait. n. 4.—Leaves stalked, ovate, fringed, slightly toothed. Stalks about three-flowered, very short. Stem woolly, erect. Capsule shorter than the *calyx*.—Native of Mexico. It has been dispersed from the garden of Madrid, to different parts of Europe, and proves a tolerably hardy greenhouse plant, flowering in summer. The stem is herbaceous, erect, a foot high, square, covered with long, dense, woolly hairs. Leaves three or four inches long, and two broad. Flowers of a pale blueish-white, the central one without *braætas*. Segments of the *calyx* hairy, very long and slender.

5. *R. clandestina*. Covert-flowering Ruellia. Linn. Sp. Pl. 885. Willd. n. 10. Ait. n. 5. (*R. capulis teretibus*; Dill. Elth. 328. t. 248.)—Leaves stalked, oblong, obtuse, somewhat toothed; tapering at the base. Stalks three-flowered, rather shorter than the leaves. Capsule nearly cylindrical, longer than the *calyx*.—Native of Barbadoes and Santa Cruz. A perennial stove plant, flowering in July and August, but seldom cultivated. The root consists of many long, thick, fleshy fibres. Stem a span high, clothed with numerous, large, undulating leaves. Flowers large, blue, on slender elongated stalks. *Calyx* linear and very narrow, scarcely above half the length of the *capsule*, which is obscurely quadrangular when ripe, containing a great number of flat, downy seeds, bordered with a white membrane. The *corolla* of the earliest flowers is said to be small and imperfect.

6. *R. paniculata*. Panicked Ruellia. Linn. Sp. Pl. 885. Willd. n. 18. Ait. n. 6. (*Speculum veneris majus*, impatientis; Sloane Jam. v. 1. 158. t. 100. f. 2.)—Leaves ovate, pointed, rough, entire. Stalks many-flowered, forked, divaricated, longer than the leaves. Upper segment of the *calyx* rather the broadest. Native of the West Indies. Sloane speaks of it as common about Kingston in Jamaica, growing among bushes. Miller and Linnæus cultivated this plant, and it may be met with sometimes in stoves, flowering in summer. The habit is somewhat shrubby, and the herbage hoary. Leaves copious, from two to four inches long, on stalks about half their length. Flower-stalks axillary, chiefly about the upper part of the stem, and extending beyond the leaves, so as to give the whole plant a panicked appearance. *Braætas* oblong, obtuse. Each flower is nearly sessile, of a bright light blue, with a long slender tube. Segments of the *calyx* hispid, linear, very narrow, one of them twice as broad as the rest. Sloane says the *capsule* throws out the seeds with violence, when it is either touched or wetted at the end.

7. *R. tuberosa*. Tuberous-rooted Ruellia. Linn. Sp. Pl. 885. Willd. n. 19. Ait. n. 7. (*Gentianella flore cæruleo, integro vasculo feminali ex humidi contactu impatientis*; Sloane Jam. v. 1. 149. t. 95. f. 1.)—Leaves ovate-wedge-shaped, crenate. Flower-stalks deeply-three-cleft.

Stem simple.—Native of Jamaica, in bushy places near Kingston, flowering after the rainy season. The perennial root consists of many long fleshy knobs. Stem erect, herbaceous, a foot high, a little hairy. Leaves spreading, minutely and sparingly hairy, each tapering down into a long footstalk. Flower-stalks slender, axillary, solitary, shorter than the leaves. *Calyx* very long and slender, rough with close bristles. *Corolla* large, of a fine blue. *Capsule* the length of the *calyx*; we do not perceive it to be more angular than that of *R. clandestina*, though Dillenius indicates the contrary. Seeds numerous.

8. *R. biflora*. Two-flowered Ruellia. Linn. Sp. Pl. 886. Willd. n. 21. Ait. n. 8. (*R. oblongifolia*; Michaux Boreali-Amer. v. 2. 23? Pursh n. 2?)—"Flowers in pairs, sessile.—Native of Carolina, from whence it was sent to Kew, in 1765, by Mr. John Cree. It is kept in the greenhouse, being an herbaceous perennial, flowering in July. We have seen no authentic specimen, nor have we any further knowledge of this species than what occurs in Linnæus. *R. oblongifolia* of Michaux, suspected by Mr. Pursh to be the same plant, is described as "ascending, all over minutely and densely downy, with erect, nearly sessile, obovate-oblong leaves, and mostly solitary flowers." Pursh adds that "the *braætas* are the length of the *calyx*, whose thread-shaped segments are the length of the tube of the *corolla*." He adds that it grows "in sandy pine woods of Georgia, flowering in June and July," and that "the flowers are a yellowish-blue," a colour not very intelligible to us; but the author only saw them dried.

9. *R. ocymoides*. Brazil-leaved Ruellia. Cavan. Ic. v. 5. 9. t. 416. Ait. Hort. Kew. Epit. 373.—Stem branched, erect. Leaves ovate, obtuse, entire; glaucous beneath. Flowers axillary, ternate. *Braætas* ovate. *Calyx* tubular at the base.—Native of Mexico; cultivated in the garden of Madrid, and introduced at Kew in 1798. It is biennial, flowering in the stove from July to September, and may perhaps be perennial in its native country. The stem is about six inches high, branched from the bottom, somewhat downy like the rest of the plant. Leaves opposite, on long stalks, concave; dark green above; glaucous beneath. Flowers sessile, with an ovate stalked *braæta* at the base of each. *Calyx* with a perceptible tube, though much shorter than the last; its segments awl-shaped, rather unequal. *Corolla* pale blue, with a white tube.

10. *R. formosa*. Large Scarlet Ruellia. Ait. n. 10. Andr. Repof. t. 610. Curt. Mag. t. 1400.—Leaves stalked, ovate, entire, downy on both sides. Stalks axillary, alternate, very long, with few flowers. *Corolla* somewhat ringent. Native of Brazil. Said to have been introduced into England by Sir Charles Cotton, in 1808. It proves a great ornament to our stoves, which are decorated all summer long with its very large and splendid scarlet flowers. The stem is in some degree shrubby, erect, three or four feet high, square, finely hairy, as well as the rest of the herbage, whose colour is a greyish-green. Flower-stalks twice or thrice as long as the leaves. Segments of the *calyx* deep and linear. Lobes of the *corolla* emarginate. *Capsule* obovate, the length of the *calyx*. Seeds numerous, lenticular, rough. Very different from the *macrophylla* of Vahl's Symbolæ, v. 2. 72. t. 39, which, according to Mr. Brown, is no *Ruellia*, having but two seeds in each cell, and still generically different, as he thinks from *R. intrusa*, &c. mentioned in our introductory part of this article.

11. *R. fulgida*. Lesser Scarlet Ruellia. Ait. n. 11. Andr. Repof. t. 527.—Leaves stalked, ovate, pointed, crenate, hairy. Tufts many-flowered, on long axillary stalks. *Corolla* somewhat ringent, with a nearly cylindrical tube.

tube.—Native of the West Indies. It made a part of a fine collection of stove plants, brought over by the late much-lamented earl of Seaforth, and given by his lordship to A. B. Lambert, esq. This plant first flowered in Mr. Lambert's stove, in June, 1807. Its habit is shrubby. *Leaves* different from the last, in being crenate and wavy. *Flowers* remarkably abundant, their stalks assembled in a corymbose manner. *Corolla* of a rich orange-scarlet, but scarcely one-third the size of the *R. formosa*. *Seeds* with a white border.

12. *R. secunda*. Yellow Ruellia. "Vahl. Symb. v. 3. 84." Willd. n. 36.—"Leaves ovate, somewhat heart-shaped, entire, villous. Clusters axillary, turned one way."—Native of the East Indies. *Herbage* downy. *Leaves* stalked, an inch long, obtuse; the younger ones hoary, rather pointed. *Footstalks* widely spreading, scarcely shorter than the leaves. *Clusters* almost a span long; the partial flower-stalks short and distant. *Braçteas* setaceous, still shorter. *Calyx* hairy. *Corolla* smooth, yellow, an inch long. *Germs* villous and hoary. Vahl. Mr. Brown not having perhaps investigated the fruit of this species, has marked its genus as doubtful.

13. *R. reptans*. Creeping Ruellia. Forst. Prodr. 44. Willd. n. 37.—"Leaves stalked, ovate, obtuse, bluntly serrated. Flower-stalks terminal, somewhat spiked."—Native of the island of Tanna. We have seen no specimen, but Mr. Brown has ascertained this to be a true *Ruellia*.

14. *R. australis*. Southern Ruellia. Cavan. Ic. v. 6. 62. t. 586. f. 1. Brown n. 1.—Flowers axillary, nearly sessile, solitary or ternate. Segments of the calyx awl-shaped, rough, separate to the base. Leaves stalked, elliptic-oblong, entire, smooth. Stem diffuse.—Native of New South Wales, from whence we received specimens from Dr. White in 1792. Mr. Brown has also observed it in the tropical part of New Holland. The stem is of humble growth, rather shrubby, more or less diffuse, branched, slender, quadrangular, smooth. Leaves most crowded towards the tops of the branches, small, hardly an inch long; paler beneath. Tube of the corolla not much longer than the calyx; its limb dilated and spreading, with rounded, entire, nearly uniform segments. We know nothing of the colour. The figure in Cavanilles is not characteristic. Its flowers are much too small in the limb. The name too is faulty.

15. *R. pumilio*. Dwarf Ruellia. Brown n. 2.—"Flowers axillary, solitary, nearly sessile. Braçteas minute. Calyx smooth, tubular at the base. Leaves narrow-oblong, obtuse. Stem diffuse."—Gathered by Mr. Brown at Port Jackson, New South Wales.

16. *R. acaulis*. Humble Ruellia. Brown n. 3.—"Stem short. Leaves oblong-wedge-shaped, obtuse. Stalks axillary, single-flowered, several times longer than the capsule. Calyx nearly smooth, without braçteas."—Gathered by Sir Joseph Banks and Dr. Solander, in the tropical region of New Holland.

17. *R. braçteata*. Braçteated Ruellia. Brown n. 4.—"Flowers axillary. Braçteas leafy, large, deciduous. Tube of the corolla elongated; its limb nearly equal. Capsule with a taper base. Leaves oblong or elliptical. Stem erect."—Gathered by Mr. Brown, in the tropical part of New Holland.

By a mistake, as we presume, *R. ringens* of Linnæus is retained as such in Hort. Kew. without any remark, and even with the erroneous synonym, which is directed to be struck out in Mr. Brown's Prodromus, 479, where the plant in question makes a new genus. See HYGROPHILA.

Mr. Pursh has three North American species, besides those to which we have adverted above, called *hybrida*,

ciliosa, and the *humifrata* of Michaux. These we dare not admit, because it does not appear that their generic characters have been critically examined by any body; at least not with a reference to the above limitations of *Ruellia*.

RUEMANNFELDEN, in *Geography*, a town of Bavaria; 36 miles E. of Ratibon.

RUENGAS, a country of Africa, S. of Monoemugi, about S. lat. 7°.

RUERLOO, a town of Holland, in the county of Zutphen; 4 miles W. of Borckeloe.

RUESCAR, a town of Spain, in the province of Grenada; 15 miles E. of Almeria.

RUESTA, a town of Spain, in Aragon, on the Aragon; 24 miles W. of Jaca.

RVEUTZENDORFF, a town of Austria; 4 miles E.N.E. of Entzerstorff.

RUFF, or RUFFLE, in *Military Language*, a beat on the drum. Lieutenant-generals have three ruffles, major-generals two, brigadiers and governors one, as they pass by the regiment, guard, &c. See DRUM.

RUFF-trees. See ROOF-trees.

RUFFACH, in *Geography*, a town of France, in the department of the Upper Rhine; 8 miles S. of Colmar.

RUFFE, in *Ichthyology*, the English name of the *cernua*; or small gilded perch, a fish common in our rivers, and much resembling the perch in figure, though of a more slender form.

The ruffe is called by the generality of authors *cernua fluviatilis*; and by some *chærus acerina* and *aspreto*. It is called by Johnson and Charleton also *serollus*. Willughby, as well as these authors, has mentioned the serollus as another species of fish; but it is proved, by observation, that they are evidently the same species. Ardeï makes this fish a perch, or *perca*; and accurately distinguishes it from the other fish of that genus by the name of the perch with only one fin on the back, and with a cavernous head. In the Linnæan system it is the *PERCA Cernua*; which see.

This fish may be preserved in glass jars with fresh water, and be made very tame. It must be fed, for it cannot subsist on the animalcula of river-water, as small dace can.

No fish shews the circulation of the blood in a finer manner than ruffles, whose fins are exceedingly transparent. Besides, it is a creature vastly tenacious of life, and will live twenty or thirty minutes out of water, without receiving much damage. Phil. Trans. N° 478. p. 26.

RUFFE, in *Ornithology*, the name of a male species of bird, the female of which is called *reeve*, and the Latin name for which is *avis pugnax*, or the fighting bird.

This species is the *TRINGA pugnax* of Linnæus; which see.

The feathers of the male assume in several parts a variety of colours; but they are distinguished by a very remarkable circle of long feathers, surrounding their necks; whence their name: on the back of their necks they have a tuft of feathers, which spread wide on both sides; these feathers around the neck are black in some birds; and in others white, yellow, or ferruginous; and they frequently differ in colour, even in the same bird; the coverts of the wings are brown or ash-coloured; the feathers on the breast black or dusky; the four exterior feathers of the tail of a cinereous brown, and the four middle barred with black and brown; the bill is black towards the end, and red at the base; the legs are yellow. In moulting they lose the neck-feathers, nor do they recover them till after their return in the following spring, when a set of small pear-shaped yellow

pimples break out on the face above the bill. The male birds of the first year want these marks: and the older they are, the more numerous are the pimples, and the fuller and longer the ruffs. The length of the male to the tip of the tail is one foot, the breadth two; of the reeve ten inches, the breadth nineteen: the weight of the former, when just taken, is seven ounces and a half, and of the latter only four. The reeves never change their colour, which is pale brown; the back spotted with black, slightly edged with white; the tail brown; the middle feathers spotted with black; the breast and belly white; and the legs of a pale dull yellow. They come over to us in vast numbers early in the spring, and disappear about Michaelmas, building in some parts of Lincolnshire, particularly in the fenny country about Croylad. They are found also in the isle of Ely, and in the East Riding of Yorkshire, and for about three weeks at Martin-mere, in Lancashire. The reeves lay four eggs, which are white, marked with large rusty spots, in a tuft of grass, the first week in May, and sit about a month. Soon after their arrival, the males begin to *hill*, *i. e.* to collect on some dry bank, near a pool of water, in expectation of the females, who resort to them. Each male keeps possession of a small piece of ground, which it runs round till the grass is worn quite away, and nothing but a naked circle left; and when a female lights, the ruffs immediately fall to fighting. When a fowler discovers one of those hills, he places his net at night, and at day-break resorts to his stand; and at the first pull takes those birds that are within reach; he then places his stales, or stuffed birds, to entice those that are traversing the fen. In this way a fowler will take forty or fifty dozen in a season. When they first come over, there are many more males than females among them; but these are so continually fighting, that their numbers soon decrease below an equality. They are fed after they are taken with bread and milk, hemp-feed, and sometimes boiled wheat; to which, if expedition is required, they add fugar, and thus they become very fat. They are killed by cutting off the head with a pair of scissars; and they discharge a great quantity of blood, considering their size. They are dressed like woodcocks, with their intestines; and when killed at the proper time, they are reckoned by the epicures very delicious. Ray and Pennant.

RUFFE is also the name of a particular species of pigeon, called by Moore the *columba cucullata rudis*.

It is in shape very like that species of pigeon called the *jacobine*, but is larger, and has a longer beak. The iris of the eye is sometimes red, sometimes pearl-coloured; the feathers of the hood and chain are much longer than the jacobine, though they do not come down so low to the shoulders of the wings, nor are they so compact and close, but are apt to blow about with every little blast of wind, and fall more backward off the head, and lie in a rough confused manner.

It is a common thing to match the jacobine pigeon with this species, with intent to improve its chain by the length of the ruffe's feathers; but the event is, that the pigeon is always worse instead of better, being longer beaked, and looser in its head and chain, without any real advantage.

RUFFEC, in *Geography*, a town of France, and principal place of a district, in the department of the Charente; 34 miles S. of Poitiers. The place contains 2110, and the canton 12,668 inhabitants, on a territory of 250 kilometres, in 20 communes. N. lat. 46° 2'. E. long. 0° 17'.

RUFFI, ANTONY DE, in *Biography*, a lawyer and historian, was born at Marseilles in 1607, and in process of time he became a counsellor in the seneschalcy of Marseilles, an office of considerable importance, and which he dis-

charged with diligence and great integrity. He was made counsellor of state in 1654, and died in 1689, at the age of 82. His leisure time, he had, during his long life, employed in learned enquiries, of which the fruits were, 1. An elaborate "History of Marseilles," fol. 2. "The Life of Gaspard de Sinicane, known by the name of the Chevalier de Coste." 3. "The History of the Counts of Provence;" and he left in MS. "A History of the Generals of the Gallies." He had a son, Louis Antony, who pursued a similar line of study, and added to his father's History of Marseilles a second volume, in an edition published in 1696. He was author, likewise, of "Dissertations Historiques et Critiques sur l'Origine des Comtes des Provence, de Venaissin, de Forcalquier, et des Vicomtes de Marseille;" and in 1716 he published "Une Dissertation Historique, Chronologique, et Critique sur les Evêques de Marseille." He died in 1724, at the age of 66.

RUFFIEUX, in *Geography*, a town of France, in the department of Mont Blanc, and chief place of a canton, in the district of Chambéry. The place contains 1048, and the canton 5110 inhabitants, on a territory of 100 kilometres, in 8 communes.

RUFFINUS, in *Biography*, surnamed by some authors *Toranius*, a celebrated ecclesiastical writer and scripture commentator, who flourished in the fourth and fifth centuries, was probably a native of Aquileia, but the time of his birth is unknown. Having made choice of the ecclesiastical profession, he was baptized in the year 369, and became a presbyter of the church in that city. Here he contracted a most intimate friendship with St. Jerome, who, in his letters to his friends, extolled in the highest terms the virtues and sanctity of Ruffinus, though at a later period he proved his most bitter enemy. In or about the year 371 Ruffinus quitted Aquileia, with the determination of devoting himself to the austerities of the monastic life, under the monks in the deserts of Egypt. Coming to Rome in his way to Africa, his design recommended him to the confidence of Melania, a Roman widow of noble family and vast opulence, who resolved to accompany him to that country, and to expend her riches in the establishment of monastic and charitable institutions. In Egypt, Ruffinus spent several months in conversing with the monks, whose solitary cells were scattered throughout the deserts of Nitria, and in attending the lectures of Didymus, master of the catechetical school in Alexandria. By the Arians, who at this time were protected by the emperor Valens, Ruffinus was persecuted, thrown into prison, cruelly treated, and at length banished to a distant desert. His female friend, Melania, however, found means to purchase his redemption, and removed with him from Egypt into Palestine, where they visited the holy place, and took up their residence at Jerusalem. In this city, Ruffinus, supported by the munificence of his patroness, built a convent for upwards of fifty females, who renounced the world and devoted themselves to a religious life, over whom Melania presided. Connected with this convent were apartments for the accommodation of the pilgrims who came to visit the holy city, and who were received, and hospitably entertained, at the expence of the foundress. Here Ruffinus spent all his leisure time in study and composition. About the year 390, a violent quarrel arose between Epiphanius, and John, patriarch of Jerusalem, concerning the opinions of Origen, in which Ruffinus took such a part as to give great offence to his friend Jerome. Their friendship was now broken off, but was in a few years renewed through the mediation of Theophilus, patriarch of Alexandria. In the year 397, Ruffinus and Melania took their leave of Jerusalem, and embarked for Italy.

Italy. Having arrived at Rome, Rufinus almost immediately published a Latin version of the first book of the "Apology for Origen," which was followed by another piece, intended to prove that the works of Origen had been corrupted and interpolated, and a defence of him drawn up from his own letters. At this period our author published his translation of Origen's "Book of Principles," with a preface, in which he applauded the high opinion which, in the earlier part of his life, Jerome had entertained of that author and his writings. This conduct was warmly resented by Jerome, who published "An Apology" for himself, in which he attacked Rufinus in the most acrimonious terms, treating him as a heretic. About the year 400 he published an eloquent and indignant reply to the accusations in his "Two Books of Invectives." Rufinus, whatever might be the nature of his arguments, was in other respects the least powerful, and he thought it advisable to retire to Aquileia. He was summoned to Rome by Anastasius, to vindicate himself against the accusations of Jerome, but he did not think it fit to obey the summons, contenting himself with sending a declaration of the conformity of his faith with that of the Catholic church, and stating that, with respect to his translation of Origen's work, he had neither approved nor disapproved, but barely refuted the sentiments of that writer. Not satisfied with this declaration, Anastasius condemned him as a heretic; but the papal anathema seems to have produced little effect on Rufinus, since it did not prevent him from continuing his controversy with Jerome, or interrupt his tranquillity or his studies. In the year 410, the ravages of the Visigoths in Italy, under Alaric, compelled him to fly from Aquileia, when he took refuge in the island of Sicily, where he appears to have died, either in the same or the succeeding year. Various characters have been given of this father. Mosheim observes, that "he would have obtained a very honourable place among the Latin writers of this century, had it not been his misfortune to have had the powerful and foul-mouthed Jerome for his adversary:" and Dupin acknowledges, "that though very ill used by St. Jerome, he was one of the ablest men in his time: perhaps he had not so much learning as that father, but his temper was better and less violent." His style is neat, and sufficiently pure in point of latinity. In his commentaries on divers parts of the scriptures, he explains the text in an elegant and natural way, chiefly adhering to the literal sense, without entangling himself in allegories. In his character of a translator from the Greek to the Latin, he takes considerable liberties, but he honestly acknowledges them. His original works, besides the pieces in controversy with Jerome, already noticed, comprize commentaries on different parts of the Old Testament; two books of Ecclesiastical History, added by him to his version of Eusebius, and continuing the history of the church to the death of the emperor Theodosius. Other works have been ascribed to him. The whole of what belongs to Rufinus, excepting his apologies for Origen and declaration to Anastasius, were published in a folio volume at Paris, in 1580. He translated the works of Josephus, the Ecclesiastical History of Eusebius, and many other works from the Greek to the Latin. Moreri. Dupin. Mosheim.

RUFINUS, minister of state to the emperors Theodosius and Arcadius, was a native of Eluzzo, now named Eauze, a town of France, in the department of Gers, according to the modern divisions of that kingdom, which in the time of Rufinus was a celebrated city, and passing from the Romans to the Goths, was taken from them by Clovis. Rufinus was brought up to the profession of the law, and being possessed of a bold and ready elocution,

with much address, and an advantageous person, he attracted some considerable share of notice at the court of Constantinople, and about 390 was raised by Theodosius to the post of master of the offices. In 392 he was nominated to the consulship, with Arcadius for a colleague; and during the same year he was entrusted with the important post of prefect of the East. He disguised his ambition and other vices under the mask of piety, by which he secured the confidence of the emperor, and obtained the friendship of Ambrose, and other dignified ecclesiastics. Having built a sumptuous palace and church at Chalcedon, he assembled the most illustrious bishops of the East to assist at the dedication, taking occasion, at the same time, to receive the rite of baptism, which in that age was often deferred to a late period. By nature he was cruel and vindictive, and committed many atrocious acts: he stimulated his master to order the dreadful massacre of Thessalonica: he procured the disgrace and exile of the brave general Promotus, who had chastised his insolence by a blow: and he effected the ruin of the prefect Tatianus, and the execution of his son Proculus, in order to make way for his own prefecture of the East. "The punishment of the two prefects," says Gibbon, "might, perhaps, be excused by the exceptionable parts of their own conduct: the enmity of Rufinus might be palliated by the jealous and unfriendly nature of ambition. But he indulged a spirit of revenge, equally repugnant to prudence and to justice, when he degraded their native country of Lycia, from the rank of Roman provinces; stigmatized people with a mark of ignominy; and declared that the countrymen of Tatianus and Proculus should ever remain incapable of holding any employment of honour or advantage, under the imperial government."

After the death of Theodosius, in 395, Rufinus succeeded to absolute authority over the Eastern empire, in the name of Arcadius, and he made use of his power for the gratification of his passions, especially that of avarice. He exhibited a very remarkable instance of his arbitrary and violent conduct in the treatment of Lucian, who had purchased his favour, and the office of count of the East. This unfortunate person, whose administration is said to have been exemplary, affronted the emperor's uncle by the refusal of an unjust request. On the complaint of Arcadius to Rufinus, the latter, without acquainting any one with his design, set off for Antioch, and performing the journey with great celerity, entered that capital in the dead of the night, and commanded the prefect to be brought before him. Without pretending to hear any thing in proof of his innocence, he caused Lucian to be scourged to death. In the mean time his own fall was rapidly approaching. To secure his authority, and with a view of raising himself to a partnership in the empire, he had planned the marriage of his daughter to the emperor. But the chamberlain, Eutropius, contrived to place in his view Eudoxia, the beautiful daughter of Frank Bauto. He became enamoured at the sight, and Rufinus, after his return, was mortified by the emperor's marriage with his daughter's rival. This disappointment, and the fear of losing the power which he possessed, inspired him, it is said, with plotting the destruction of his sovereign, and with inviting the Huns and Goths to invade the empire, in order to create a general confusion. The famous Stilicho was at this time omnipotent in the Western empire as minister of the young Honorius, brother to Arcadius; and claiming from the appointment of Theodosius the guardianship of both his sons, he prepared to march into the East, in order to assert his authority there. At the head of the armies of both parts of the empire he had crossed the Alps, and was near Thessalonica, when Rufinus,

finus, dreading his approach, procured an order from Arcadius for the Eastern forces to separate from Stilicho and march to Constantinople. The general did not venture to disobey, and placed them under the command of Gainas, the Goth, with whom he had concerted his plan. The army arrived before the capital of the East, in November 395, and the emperor, with Rufinus, went out to meet it. At the distance of a mile from the capital, in the field of Mars, the troops halted. Arcadius and his minister advanced, according to an ancient custom, respectfully to salute the power that supported the throne. Rufinus expected that his partizans would take that opportunity of proclaiming him emperor, and had actually prepared the purple robe, diadem, and royal donative for the occasion. By the direction of Gainas, however, the wings wheeled round and inclosed their victim, and upon a signal given, a soldier plunged his sword into his breast. Rufinus fell, groaned, and expired at the feet of the affrighted emperor. His mangled body was abandoned to the brutal fury of the populace of both sexes, who hastened in crowds, from every quarter of the city, to trample on the remains of the haughty minister, at whose frown they had so lately trembled. His right hand was cut off and carried through the streets of Constantinople, in mockery, to extort the contributions for the avaricious tyrant, whose head was publicly exposed, borne aloft on the point of a long lance. According to the savage maxims of the Greek republics, his innocent family would have shared the punishment of his crimes; but they fortunately took refuge in a sanctuary, which protected them from the raging madness of the people, and they were permitted to spend the remainder of their lives in the exercises of Christian devotions, as they were called, in the peaceful retirement of Jerusalem.

Rufinus is said to have been well versed in elegant literature, yet a poet has been the bitterest foe to his memory. Claudian has made him the subject of two books of invectives, probably for the purpose of ingratiating himself with Stilicho, the avowed enemy of Rufinus. Univer. Hist. Gibbon, vol. v.

RUFISCO, in *Geography*, a town of Africa, in the kingdom of Kayor, situated on the sea-coast. Its name is a corruption of "Rio-fresco," its Portuguese appellation. It contains about 300 houses, and the inhabitants carry on a considerable trade with Europeans in slaves, skins, gum, ivory, ostrich feathers, cotton, indigo, &c.; 60 miles W.N.W. of Amboul.

RUFS, a town of Prussian Lithuania; 20 miles N.W. of Tilsit.

RUFTER-HOOD, among *Falconers*, a plain leathern hood, large and open behind, to be worn by a hawk when she is first drawn.

RUFUMBA, in *Geography*, a town of Mombique, on the Suabo. S. lat. $6^{\circ} 25'$. E. long. $35^{\circ} 30'$.

RUFUS, the Ephesian, in *Biography*, a physician and anatomist of considerable eminence, in the reign of the emperor Trajan, was apparently entitled to the reputation which he obtained by his extensive knowledge and experience. Galen esteemed him one of the most able of the physicians who had preceded him. Rufus appears to have cultivated anatomy, by dissecting brutes, with great zeal and success. He traced the origin of the nerves in the brain, and considered some of them as contributing to motion, and others to sensation. He even observed the capsule of the crystalline lens in the eye. He considered the heart as the seat of life, and of the animal heat, and as the origin of the pulse, which he ascribed to the *spirit* of its left ventricle and of the arteries; and he remarked the

difference in the capacity and thickness of the two ventricles. He deemed the spleen to be a very useless viscus, and his successors have never discovered its use. He examined very fully the organs of generation, and the kidneys and bladder; he has left, indeed, a very respectable treatise on the diseases of the urinary organs, and the methods of cure. He also wrote a good work on purgative medicines, mentioning their different qualities, the countries from which they were obtained; and a little treatise on the names given by the Greeks to the different parts of the body. Galen affirms also that Rufus was the author of an essay on the *materia medica*, written in verse; and Suidas mentions a treatise of his on the *atra bilis*, with some other essays; but these are lost. See Sprengel, Geschichte der Arzneikunde, 2 theil, p. 63; and Le Clerc, Histoire de la Médecine, part iii. p. 104.

RUFUVEILLE, in *Geography*, a town of France, in the department of the Channel; nine miles W. of Mortain.

RUGBY, a small market-town and parish in the hundred of Knightlow, and county of Warwick, England, is situated at the distance of 19 miles E.N.E. from Warwick, 12 miles E. from Coventry, and $84\frac{1}{2}$ miles N.W. by N. from London. This place is called Rocheberie in Domesday-book, as Dugdale conjectures, from the word Roche, signifying a rock, or quarry of stone, and Berie, a court, or habitation of note. Hence it has been supposed to have been a town of importance in early Saxon times, but the records of its remote history have entirely perished. After the Conquest it formed part of the possessions of Turchil de Warwick, from whom it was held by one Eddulfus, whose posterity continued to enjoy it till the reign of Edward I., when it was conveyed, by marriage, to the family of Goband, from whom it passed to the barons of Stafford. The situation of Rugby is lofty, and commands an extensive view over the adjacent country. The houses are disposed in the most irregular manner, and are, in general, constructed of wood. Here is a charity school, founded and endowed for the education of thirty boys, by Richard Elborow, esq.; also a grammar-school, which was founded by Laurence Sheriff, esq., in the ninth year of the reign of queen Elizabeth. The latter is a very important establishment, and is under the direction of twelve trustees, who are appointed from among the nobility and principal gentry of the county. By judicious management the property of this school, though originally trifling, has become extremely valuable, yielding a rent of 2000*l.* per annum, and when the present leases shall expire, the rent will doubtless be considerably increased. The trustees hold regular meetings for the trans-action of business; and in August an annual examination of the pupils takes place before them. There are fourteen exhibitioners sent from this school to the universities, each of whom is allowed 40*l.* a-year. When vacancies occur, they are filled up at the annual examinations, which are attended by a member from both universities, appointed for the purpose by the vice-chancellor. The scholars at present amount to about 330 in number, of whom 50 are on the foundation. The old buildings of this school having been found unsuitable to its extended condition from the period of their erection, a new structure has been raised nearly on the same site, since the year 1808. This edifice is built in the style of architecture prevalent in the reign of queen Elizabeth, when the school was founded, and is admirably adapted to the purposes for which it was erected. It is composed of white brick, but the angles, cornices, and dressings to the windows and entrances, are of stone. The principal front extends 220 feet in length, and has a tower gateway in the centre, which leads into the principal court, a fine area 90 feet long, by 75 wide, with a plain cloister on three sides.

On the south side of the court are, the dining-hall for the boys in the head-master's house, and three schools for different classes; the west side is occupied by the great school, and that on the north by the French and writing schools. The head-master's house is placed at the eastern end of the south front; and between it and the schools is a range of building, divided into small apartments, appropriated to the use of the students. About sixty boys are thus accommodated; the remainder lodge with the other master, or at boarding-houses in the town. This building was designed and erected by Henry Hakewill, esq., architect.

The church of Rugby is not worthy of notice, but the church-yard is remarkable for various eccentric inscriptions. The market-day here is Saturday, weekly; and fairs are held on the 17th February, 31st March, 15th May, 7th July, 21st August, Monday before the 29th of September, 22d November, and 10th December. No manufacture of any importance is carried on in this town, but it has acquired a small trade for the supply of the adjacent country, since the formation of the Oxford canal, which passes about a mile to the northward, and forms a branch of the system of inland navigation, which connects all the principal rivers and towns in England.

Adjoining to Rugby, on its north-eastern side, is an eminence called Castle mount, from the circumstance of its having been formerly the site of a castle. Dugdale is of opinion that this fortress was one of those erected in king Stephen's time, when he was threatened with invasion by the empress Maud, whose crown he had usurped. It was most probably demolished by order of king Henry II. in the third year of his reign. The only vestiges of it now visible are parts of the moat and some embankments.

According to the parliamentary returns for 1811, Rugby parish contains 335 houses, and 1805 inhabitants, of whom nearly 1000 reside in the town. The *Antiquities of Warwickshire, &c.* by William Dugdale, fol. London, 1657. *Beauties of England and Wales*, vol. xv. 1814, by I. N. Brewer.

RUGEL, a town of Baden, near the Rhine; 10 miles N.N.W. of Friburg.

RUGEN, an island in the Baltic, separated from the coast of Pomerania, by a strait not above a mile wide; about 60 miles in circumference, without including the indentations of the coast. Its name is said to be derived from the Rugi, who first inhabited the Pomeranian coast beyond the Oder, but afterwards removed on this side of that river, taking up their chief residence in the country called after their name. On the decease of the last prince of Rugen, duke Wartislav XI., in 1478, Rugen became united with Pomerania. In 1168 it was subdued by Waldemar I., king of Denmark, its temple was demolished, the pagan worship suppressed, and Christianity established. There the divines of Rugen became vassals to the crown of Denmark. At the treaty of Westphalia, Rugen was added to Sweden, as a particular principality. At the peace of Roschild in 1658, and also at that of Copenhagen in 1660, Denmark ceded to Sweden the whole jurisdiction, civil and ecclesiastical, which it had previously exercised over certain lands in the principality of Rugen. This island is not only encompassed by the sea, but so penetrated by it, that several other islands and peninsulas are thus formed. The soil is fruitful, particularly in all kinds of grain, so that some thousands of lasts are annually shipped off for Stralsund. It breeds likewise large stocks of cattle, and yields a large quantity of fish; but Pomerania supplies it with fuel. The nobility are numerous, and invested with considerable privileges. The

prefident of the provincial tribunal, who must be a native, and a nobleman, is the prefect or governor, and he is assisted in the administration by a secretary and purveyor. Rugen contains 27 parishes, and 21,240 inhabitants. Its capital is Bergen. N. lat. 54° 30'. E. long. 13° 30'.

RUGENWALDE, a town of Hinder Pomerania; 20 miles N.E. of Cofslin. N. lat. 54° 33'. E. long. 16° 7'.

RUGGA, a town of Africa, in Tunis, anciently called "Carago;" 40 miles S. of Cairoan.

RUGGARD, a town of Denmark, in the island of Funen; 10 miles W. of Odenfee.

RUGGED ISLE, a small island near the S. coast of Ireland, and county of Cork. N. lat. 51° 30'. W. long. 9° 2'.

RUGGED Point, a cape on the N. coast of Cumbava. S. lat. 8° 9'. E. long. 118° 58'.

RUGGIOLA, a sort of Spanish slate, serving in many places in the room of tiles and brick. It is a flaky stone of the nature of some of our grey slates, and is cut out of a mountain near Cordova; a plate of this being well heated on both sides, will retain its warmth for twenty-four hours.

The people of Cornwall and some parts of Yorkshire use a stone, which is of a talcky nature, to warm themselves when in bed, applying it at the feet of the bed. This they call the warming stone, from its use, and it will retain a sensible heat six or eight hours, after once moderately warming. Plot's Oxfordshire, p. 258.

RUGLERSREUT, in *Geography*, a town of Saxony, in the principality of Culmbach; three miles N. of Gefrees.

RUGLES, a town of France, in the department of the Eure, and chief place of a canton, in the district of Evreux; 21 miles S. of Evreux. The place contains 1564, and the canton 12,105 inhabitants, on a territory of 240 kilometres, in 26 communes.

RUGLEN. See RUTHERGLEN.

RUGMAN, JONAS JOHN, in *Biography*, a learned Iceland, was born in 1636, and received his early education at the school of Hulum. He afterwards set out for Copenhagen, in order that he might enter himself at the university, but Denmark and Sweden being, at that time, engaged in war, he was made prisoner on the way, in 1658, and carried to Gottenburg, where he was patronized by a person named Brahe, who placed him at Wissenborg school, whence he was sent to the academy of Upsal, with a pension from the king. He became acquainted with Olof Verelius, the Swedish historian and antiquary, who, immediately after the peace, sent him to Copenhagen, and thence to Iceland, for the purpose of collecting ancient manuscripts, a great number of which he brought to Sweden. He went again to Copenhagen in 1665, and brought back with him a transcript of Oluf Trygvessen's History, "Ex Codice Wormiano Membranaceo." When the college of antiquities was established at Upsal in 1667, he was one of the earliest members, but died in two years afterwards, at the age of 43. He was author of many learned works, the titles of which are given in the General Biography. Among them may be mentioned "Fragmenta quædam Legum veterum collecta ex diversis Scriptoribus et Historiis, Lingua eadem;" "Versio Svetica Historiæ Veteris Islandicæ Lingua scriptæ de Regibus Norvægorum, quæ vulgo Konuriga-Sagur nuncupantur." Gen. Biog.

RUGOSUM, FOLIUM, in *Botany*. See LEAF.

RUGUPORUM, in *Geography*, a town of Hindooftan, in Golconda; 25 miles S.W. of Warangole.

RUHELAND, a town of Germany, in the principality of Blankenburg; five miles S.S.W. of Blankenburg.

RUHLA,

RUHLA, a town of Saxony, in the principality of Eifenach, celebrated for its manufacture of knives; four miles S. of Eifenach.

RUHLAND, or **RULAND**, a town of Upper Lufatia, on the river Elfter; 27 miles N. of Dresden. N. lat. 51° 27'. E. long. 13° 50'.

RUHNKEN, **DAVID**, in *Biography*, an eminent critic, was born in 1723, at Salop, in Pomerania, of parents in a reputable situation of life. He received the early part of his education at his native place, after which he went to the Frederician college at Konigsberg, from whence, at 18, he proceeded to the university of Wittemberg, where he paid particular attention to the lectures of Ritter on jurisprudence and history, and those of Berger on Roman eloquence and antiquities; he did not, however, neglect other important branches of study, *viz.* the mathematics and philosophy. He was intended, by his parents, for the church, and they were desirous that he should conclude his studies with a course of theology; but the ardour which he had imbibed for philological enquiries induced him to repair to Leyden, where the learned Hemsterhuys was then in the height of his reputation. To this professor he particularly attached himself, who, in return, recommended him several private pupils. Ruhnken resolved to settle in that country, as well on account of the select society, as of the philosophical liberty for which Holland was, at that period, peculiarly distinguished. In the year 1749, being the sixth year of his residence at Leyden, he first made himself known as a critic by a Latin epistle to the celebrated Valekenaar on Homer's hymns, and Hesiod, which was followed, in 1751, by another to Ernesti, on Callimachus and Apollonius Rhodius. Both of these displayed consummate skill in the Greek language, with great compass of erudition and elegance of taste. At this time, by the advice of Hemsterhuys, he renewed his study of jurisprudence, in order to qualify himself for a professorship, those of polite literature being pre-occupied; and in 1752 he edited some Greek commentaries upon a part of the Code and Digest with a Latin version and learned notes. He next edited "Timæi Lexicon Vocum Platoniarum," a piece which gave full scope to that grammatical criticism in which he particularly excelled. "This," according to the learned Brunk, "in the whole circle of Greek literature, is both the shortest and most learned work." In the year 1755, Ruhnken visited Paris, where he remained a year most assiduously occupied in copying and collating MSS. in the public libraries. After his return, in 1757, he was appointed reader of the Greek in the university, and upon this occasion he pronounced an oration "De Græcis Artium et Doctrinarum Inventrice." In four years after this, he succeeded to the chair of history and eloquence, delivering for his inaugural speech an oration "De Doctore Umbratico." By this appellation, says his biographer, he meant to characterize the man of letters who confines himself to the shade of his own school, surrounded by admiring scholars, and shunning the commerce of the world at large; and the picture which he drew was so well delineated, that it gave offence to certain persons who supposed it to be designed as a portraiture of themselves. About this period he refused a professorship at Gottingen, recommending Heyne to fill the office. In his forty-first year he married a beautiful young woman of eighteen, by whom he had two daughters, but the comfort of this alliance was, in a few years, destroyed by an apoplectic attack, which deprived his wife of sight and speech. He seems hitherto to have lived in a social unshackled manner, enjoying the company of his friends, and participating in all

common amusements. He was remarkably fond of hunting, or rather coursing, a sport of which he was a great matter, few surpassing him in the breed of his greyhounds, or in agility in leaping over the water-ditches, so frequent about Leyden. This pastime, apparently so very uncongenial to a literary mind, he continued almost to the last year of his life, and he thought it enabled him to resume his studies with peculiar spirit and effect. In the year 1767 he was Rector Academiæ, and on quitting his office he pronounced a very elegant eulogy on Hemsterhuys, who had died in the preceding year. In 1774 he was made librarian to the university, in which station he took great pains in making additions to the stock of valuable books. He preserved his health to an advanced age, till at length he became subject to catarrhal and dropical complaints, under which he sunk in May 1798, in the 76th year of his age. He was the editor of many learned works, among which are the following: "Rutilius Lupus," with "Aquila Romanus," and "Julius Rufianus;" "De Figuris sententiarum;" "De Vita et Scriptis Longini;" "Velleius Paterculus;" "Homer's Hymns;" a very much enlarged edition of "Timæi Lexicon;" an edition of the "Works of Muretus;" the two last were published in the year 1789. He afterwards employed himself in an edition of the Scholiasta of Plato; and an improved edition of Scheller's Latin dictionary. This learned man placed all his glory in philological acquirements, which he seemed to regard as the highest species of knowledge. He not only made very light of theological studies himself, but discouraged them in all young men who possessed strong natural talents and promising abilities. A very tenacious memory had stored his mind with a vast mass of critical matter, especially of every thing that related to grammar, which he applied with much clearness and sagacity. He was one of the most correct Grecians of his age, and was surpassed by none in the purity and elegance of his latinity, both in speaking and writing. He left very little property behind him, excepting a library, rich in valuable printed books and manuscripts, which were purchased by the states of Holland for the university of Leyden, upon the condition of annuities for life to his widow and daughters.

RUHR, in *Geography*. See **ROER**.

RUHRORT. See **ROERORT**.

RUHTE, a town of Westphalia, in the bishopric of Hildesheim, at the conflux of the rivers Innersee and Leine; seven miles N.W. of Peine.

RUJAMPET, a town of Hindoostan, in Tellingana; 22 miles S. of Ramgur.

RUIB, a small island in the Pacific ocean, near the coast of Waygoo. N. lat. 0° 4'. E. long. 130° 20'.

RUIJUEAH, a town of Hindoostan, in Lahore; 36 miles W. of Lahore.

RUINART, **TIMERRY**, in *Biography*, a learned French writer, who flourished at the close of the 17th and at the beginning of the 18th centuries, was born at Rheims in the year 1657. When very young he took the habit among the Benedictine monks of the congregation of St. Maur, and, after going through the usual course of philosophy and divinity in the abbey of St. Peter at Meaux, devoted his chief attention to the study of the sacred scriptures, the fathers, and the ancient ecclesiastical writers. These branches of learning he cultivated with so much ardour and success, that he was soon selected by father Mabilion to be his assistant in his learned labours. In 1689 he shewed his talents as an author, by publishing at Paris "Acta primorum Martyrum sincera et selecta, collecta et edita cum notis," with a learned preface, in which

which he undertakes to refute the hypothesis of Dodwell, "De paucitate Martyrum." This work was several times reprinted with considerable additions. The next publication was an improved edition, in 1694, of "Victoris Vitenfis Hiltoria Persecutionis Vandalicæ." In 1699 he published a new and greatly esteemed edition of "S. Gregorii Turgonensis Episcopi, Opera Omnia, necnon Fredegarii Scholasticæ Epitome et Chronicon cum suis continuatoribus et aliis antiquis Monumentis:" he was the author and editor of many other works, and in 1709 he published a sketch of the "Life of Father Mabillon," and he died in the same year at the age of 52. His works afford abundant evidence that he was a man of deep research and profound learning: they recommend themselves by their accuracy, perspicuity, and neatness of style. The author, however, was not more respected for his learning, than he was esteemed for his humility, modesty, and piety.

RUINES, in *Geography*, a town of France, in the department of the Cantal, and chief place of a canton, in the district of St. Flour; six miles E.S.E. of St. Flour. The town contains 649, and the canton 7994 inhabitants, on a territory of 275 kilometres, in 15 communes.

RUININE OIL, a name given by some authors to the oil of the palma Chrilli, which is very common in the West Indies, and is used by the common people in lamps. It is a delicate, sweet, and transparent oil, and has no peculiar operation in physic. They often give it in glysters from one spoonful to three at a time, and it has only the effect of common oil; but the leaves of the plant are one of the grand medicines of the Negroes; bruised and applied to the head, they are thought to be an almost infallible remedy for the head-ache, of whatever kind, or from whatever cause. See *CASTOR-Oil*.

RUINS, a term particularly used for magnificent buildings fallen to decay by length of time, and of which there only remains a confused heap of materials.

Such are the ruins of the tower of Babel, of the tower of Belus, two days journey from Bagdat, in Syria, on the banks of the Euphrates; which are now no more than a heap of bricks, cemented by bitumen; and of which we only perceive the plan to have been square.

Such also are the ruins of a famous temple, or palace, near Schiras, in Persia, which the antiquaries will have to have been built by Ahasuerus; and which the Persians now call Tchelminar, or Chelminar; *q. d.* the forty columns; because there are so many columns remaining pretty entire, with the traces of others; a great quantity of basso relievos, and unknown characters, sufficient to shew the magnificence of the antique architecture. The ruins of Palmyra may also be reckoned in the class of famous ruins.

RUISCH, RACHEL, in *Biography*, was born at Amsterdam in 1664, the daughter of Frederick Ruisch, or Ruysch, the celebrated professor of anatomy. The very early disposition she exhibited for drawing flowers, and the extreme accuracy and minuteness with which she had copied prints without assistance, induced her father to place her under the tuition of William Van Aelt, an eminent flower-painter.

In a few years she became the rival of her master, and at length surpassed him; and indeed, as far as a neat and correct imitation of a single flower, a leaf, or an insect goes, she has been equalled by few. The great defect in her productions is a want of combination, the parts being separated, and the masses weak; which is the more to be lamented, as her choice of objects was remarkably elegant, and her manner of treating them perfection itself, even to illusion.

Her extraordinary talents recommended her to the peculiar patronage of the elector palatine, who in 1708 ap-

pointed her his paintress; and he was so great an admirer of her works, that he possessed a considerable portion of them, and rewarded their author munificently. She continued to exercise her talents, with almost unimpaired success, to a very advanced period of her existence, and died at Amsterdam in 1750, at the age of 86.

RUISSEAU, GRAND, in *Geography*, a settlement in the Indiana territory, on the left bank of the Mississippi.

RUISSKAR, a small island on the east side of the gulf of Bothnia. N. lat. 61° 24'. E. long. 21° 8'.

RUIVAINS, a town of Portugal, in the province of Tras os Montes; nine miles S. of Montalegre.

RUIZIA, in *Botany*, named by Cavanilles in honour of Don Hippolito Ruiz, a Spanish botanist, who studied under the celebrated Mutis in South America, and who in conjunction with Pavon, another pupil of Mutis, published the splendid *Flora Peruviana*.—Cavan. Diff. 3. 117. Schreb. 466. Willd. Sp. Pl. v. 3. 798. Ait. Hort. Kew. v. 4. 221. Juss. 275.—Class and order, *Monadelphica Polyandria*. Nat. Ord. *Columnifera*, Linn. *Malvacea*, Juss.

Gen. Ch. *Cal.* Perianth inferior, double; outer of three, ovate, concave, acute, deciduous leaves; inner of one leaf, permanent, cloven into five, lanceolate segments. *Cor.* Petals five, obliquely sickle-shaped, rounded at the tip, undivided, flat, spreading, fastened to the bundle of stamens. *Stam.* Filaments numerous, generally from thirty to forty, shorter than the corolla, united at their base into the form of a pitcher, inclosing the germen; anthers oblong, incumbent. *Pistl.* Germen superior, globose, ten-furrowed; styles ten, short; stigmas simple. *Peric.* Capsules ten, compressed, membranaceous, woody on the back, boat-shaped, of one cell, united into a globular, umbilical whorl. *Seeds* two, roundish, or slightly triangular, pointed.

Obf. This genus is nearly akin to *ASSONIA*; see that article.

Ess. Ch. Calyx double; outer of three leaves. Styles ten. Capsules ten, of one cell, with two seeds, and disposed in a circle.

1. *R. cordata*. Heart-leaved Ruizia. Willd. n. 1. Cavan. Diff. t. 36. f. 2.—Leaves heart-shaped, lanceolate, wavy.—Native of the Isle of Bourbon, where it flowers in March and April. *Stem* shrubby, branched. *Leaves* alternate, stalked, numerous, ovate, pointed, notched. *Stipulas* awl-shaped, whitish, powdery, deciduous. *Flowers* in umbel-like terminal corymbs, sulphur-coloured, each on a short stalk.

2. *R. lobata*. Lobed Ruizia. Willd. n. 2. Cavan. Diff. t. 36. f. 1.—Leaves heart-shaped, five-lobed, notched.—Found also in the Isle of Bourbon, flowering in February and March. A handsome *shrub*, five or six feet high, much branched, with a greyish-white bark. *Leaves* crowded together at the extremities of the branches, alternate, stalked, smooth above, white and dusty beneath, the older divided into five, rarely into seven, lobes. *Stipulas* awl-shaped, erect, downy or powdery, deciduous. *Flowers* like those of the above species in form and colour.

3. *R. variabilis*. Various-leaved Ruizia. Willd. n. 3. Jacq. Hort. Schoenbr. v. 3. 24. t. 295. (*R. palmata* and *R. laciniata*; Cavan. Diff. t. 37. f. 1, and 2.)—Leaves of the flowering branches palmate; those of the barren ones digitate.—Native of the Isle of Bourbon, and introduced at Kew, in 1792, where it flowers in May. A very handsome *shrub* of rather humble, but diffuse, growth. *Stems* wavy, furrowed, brown. *Leaves* alternate, stalked, dark green above, whitish underneath, extremely curious for the

variety of their shape, expressed in the specific character, and which is admirably shewn in Jacquin's figure. *Flowers* in umbel-like corymbs, of a pale red or crimson colour, with deep red claws. The name of this is by mistake engraved *R. diversifolia*, instead of *variabilis* in Jacquin's plate.

In Commerfon's MSS. this genus was called *Kenigia*.

RUKHADORFF, in *Geography*, a town of Austria; four miles N.N.E. of Sonneberg.

RUKI, a town of Mingrelia, in which the palace of the prince is surrounded with a thick wall, seated on a river which runs into the Black sea; 200 miles W. of Teflis.

RUKKIA, in *Zoology*, a name given by some to a peculiar kind of squirrel, found in the island of Ceylon.

RUKMENI, in *Hindoo Mythology*, is the name of one of the wives of Krishna, who being an incarnation of Vishnu, his heavenly consort Lakshmi, is represented to have also descended in this form of Rukmeni to accompany him. In many authorities she appears to be the same person as Radha, Krishna's favourite wife: but others make a difference, stating that Rukmeni was his legal worldly wife, and that Radha is a personification of religion. Others again say, that Rukmeni was the spiritual spouse. If, however, it be admitted, that such a person as Krishna ever existed, we may farther admit, that he had a plurality of wives, and that the two women in question were among them. A list of his wives, eight in number, will be found under KRISHNA. Rukmeni is usually the first on the list. She is said to have been the daughter of a Raja Bhislmaka; and another of her names is Kantamati. On the death of Krishna, Rukmeni, with several others of his wives, burnt themselves, in view to an immediate reunion with their lord in Vaikontha, the paradise of Vishnu. This self-immolation is called *Sati*; and under that article some account is given of it. Rukmeni is related to have borne a son to Krishna, of whom very frequent mention is made in Hindoo writings, being no other indeed than Kama, the god of love, incarnated in the person of their son Pradyamna. As the mother of the Hindoo Cupid, we here find Lakshmi (recollecting that Rukmeni is that goddess in another form) corresponding, as in many other instances, with the Venus of Western mythologists. See KAMA, LAKSHMI, PRADYAMNA, and RETI, for farther notice of these fables. Under KRISHNA, RADHA, and VAIKONTHA, will also be found some particulars connected with the subjects of this article. It may be farther noticed, that in temples dedicated to the worship of Krishna, statues of Rukmeni are commonly seen. Calts, said to be of her, are also common. In other *avataaras*, or *descents* of Vishnu, his consort is said to have accompanied him under the name of Rukmeni. See hereon under WITTOBA.

RULE, or RULER, *Regula*, a very simple instrument, ordinarily of hard wood, thin, narrow, and straight, serving to direct the drawing of right lines.

The rule is of principal use in all the mechanical arts.

To prove whether or no it be just, draw a line by it on paper; then turn the rule about, the right end to the left, and apply the same edge this way to the line; if the edge now agree exactly with the line, the ruler is true.

Desmarets has a fine poem on the amours of the rule and compass. The stone-cutters' rule is usually four feet long, and divided into feet and inches.

The masons' rule is twelve or fifteen feet long, and is applied under the level to regulate the courses, to make the piedroits equal, &c.

RULE, *Parallel*, or *Ruler*. See PARALLEL.

RULE is also applied to certain instruments which have other considerable uses besides that of drawing lines. Such are the carpenters' joint-rule, Everard's and Coggeshall's sliding-rules, &c.

RULE, *Carpenters' joint*, is an instrument usually of box, 24 inches long, and $1\frac{1}{2}$ broad, each inch being subdivided into eight parts. On the false side with these divisions is usually added Gunter's line of numbers.

On the other side are the lines of timber and board-measure, the first beginning at $8\frac{1}{2}$, and continued to 36, near the other end; the latter is numbered from 7 to 36, 4 inches from the other end. (*Plate VI. Surveying, fig. 14.*) The division of the timber-line is formed from a consideration, that 1728 inches make a solid foot, in the following manner: thus, 9 is so placed against one of the divisions of inches, or parts on the other side of the rule, beginning from the right hand, that its square, which is 81 inches, multiplied by that number of inches and parts, must make 1728 inches; which, dividing 1728 by 81, must be placed against $21\frac{1}{4}$ from the right hand; and 10 must be placed against $17\frac{3}{8}$ inches; because 1728 divided by the square of 10 or 100, gives $17\frac{3}{8}$, &c. But because a square whose side is 1, 2, &c. to 8 inches, requires more than 24 inches in length, as a multiplier, in order to produce 1728 inches; and since the length of the rule is only 24 inches, there is a table upon the left end of it, which supplies its defect of length. In this table the upper row of figures, *viz.* 1, 2, 3, 4, 5, 6, 7, 8, denotes inches, or the lengths of the sides of squares; and the second and third rows are the correspondent feet and inches to make up a solid foot. It is made by dividing 144 inches by the squares of 1, 2, 3, 4, 5, 6, 7, 8.

The line of board-measure is thus divided: suppose the division 7 to be marked; divide 144, the number of inches in a square foot, by 7, and the quotient will be $20\frac{4}{7}$ inches; whence the division 7 must be against $20\frac{4}{7}$ inches on the other side of the rule. To mark the division 8, divide 144 by 8, and the quotient, which is 18 inches, must be placed on the line of board-measure against 18 inches on the other side, &c. But because the side of a long square, that is, 1, 2, 3, 4, 5 inches, requires the other side to be more than 24 inches, the whole length of the rule; there is a table annexed, formed by dividing 144 inches by each of the numbers in the upper row, and then each of the quotients by 12, to reduce them into feet.

RULE, *use of the carpenters' joint*. The application of the inches in measuring lengths, breadths, &c. is obvious. That of the Gunter's line, see under GUNTER'S LINE. The use of the other side is all we need here illustrate.

1. *The breadth of any surface, as board, glass, &c. being given, to find how much in length makes a square foot.*—Find the number of inches the surface is broad, in the line of board-measure, and right against it, on the inches side, is the number of inches required. Thus, if the surface were 8 inches broad, 18 inches will be found to make a superficial foot.

Or, more readily, thus. Apply the rule to the breadth of the board or glass, that end marked 36 being even with the edge; the other edge of the surface will shew the inches and quarters of inches which go to a square foot.

To find the content of a given surface. Find the breadth, and how much makes one foot; then turn that over as many times as you can upon the length of the surface, and so many feet does the surface contain.

2. *Use of the table at the end of the board-measure.* If a surface be one inch broad, how many inches long will make a superficial foot? Look in the upper row of figures for

1 inch, and under it, in the second row, is 12 inches, the answer to the question.

3. *Use of the line of timber-measure.* This resembles the former; for, having learnt how much the piece is square, look for that number on the line of timber-measure; the space thence to the end of the rule is the length, which, at that breadth, makes a foot of timber. Thus, if the piece be 9 inches square, the length necessary to make a solid foot of timber is $21\frac{1}{4}$ inches. If the timber be small, and under 9 inches square, seek the square in the upper rank of the table, and immediately under it are the feet and inches that make a solid foot. Thus, if it be 7 inches square, 2 feet 11 inches will be found to make a solid foot.

If the piece be not exactly square, but broader at one end than another, the method is, to add the two together, and take half the sum for the side of the square. For round timber, the method is, to girt it round with a string, and to allow the fourth part for the side of the square. But this method is erroneous; for hereby you lose above $\frac{1}{4}$ th of the true solidity. See *SLIDING Rule* and *TIMBER*.

RULE, Caliber. See *CALIBER*.

RULE, Everard's sliding. } See *SLIDING Rule*.

RULE, Coggeball's sliding. }

RULE, Regula, also denotes a certain maxim, canon, or precept to be observed in any art or science. Thus we say, the rules of grammar, of logic, of philosophizing, &c.

School philosophers distinguish two kinds of rules; *viz.* *theoretical, or rules of knowing*, which relate to the understanding, being of use in the discovery of truth; and *practical, or rules of acting*, which relate to the will, and serve to direct it to what is good and right.

For the management and application of these two sorts of rules, there are two distinct arts; *viz.* *logic* and *ethics*: see each respectively.

RULES of knowing, regula sciendi, are such as direct and assist the mind, in perceiving, judging, and reasoning.

RULES of acting, regula agendi, are those by which the mind is guided in her desires, pursuits, &c.

Authors are extremely divided about the regard to be had to the rules of poetry fixed by the ancients, Aristotle, Horace, Longinus, &c. and admitted by the modern critics, as Bossu, &c. some contending, that they must be inviolably observed; others pleading for liberty to set them aside on occasion. Rules, it is complained, are fetters; rank enemies to genius; and never religiously observed by any, but those who have nothing in themselves to depend on. Voiture frequently neglected all the rules of poetry, as a master who scorned to be confined by them.

The theatre has its particular rules, as the rule of twenty-four hours, the unities of action, time, and place, &c. If it be true, says Moliere, that plays conducted according to the rules do not please, but those which are not, do, the rules must be naught. For myself, when a thing hits and diverts me, I do not enquire whether I have done amiss, nor whether Aristotle's rules forbid me to laugh.

RULES of philosophizing. See *PHILOSOPHIZING*.

RULE, in Arithmetic, denotes a certain method of performing particular arithmetical operations, as the rules of addition, subtraction, multiplication, and division; which four are called the fundamental rules of arithmetic, all other operations being dependant on one or more of these. See *ADDITION, SUBTRACTION, &c.*

From the combination of these rules various others are derived, and, we must add, many more than ought to be distinctly characterized. Thus, our writers on arithmetic give us the rules of barter, simple interest, brokerage, factorage, rebate and discount, exchange, tare and tret, and a vast variety of others, which are, in fact, only so many examples

in the rule of proportion (or, as it is commonly called, the rule of three), and ought, therefore, to be included under that general term.

At a time when arithmetic and geometry formed almost the only subjects of a mathematical education, long spun-out treatises of arithmetic, and extensive elementary works on geometry, were at least excusable; but since the improvements that have been made in analysis, the two former subjects form but a very small part of what is necessary to be known, for a person to have any pretensions to the character of a mathematician; and it is, therefore, astonishing that writers on those subjects, particularly those on arithmetic, have not thought of contracting their works, by condensing under one head a number of different rules, now given under distinct titles, and transforming others, such as position, alligation, &c. to introductory treatises on algebra, to which branch they more properly belong. By a judicious arrangement of this kind, the two subjects of arithmetic and elementary algebra might be very well condensed into the usual size of an arithmetic, and a boy be made to acquire a competent knowledge of both subjects, in less time than is usually employed in taking him through arithmetic only.

RULE of Three, or Rule of Proportion, by some former writers called also the *Golden Rule*, is one of the most extensive and useful rules in arithmetic, teaching how to find a fourth proportional to three given numbers.

The rule of three has commonly been divided into two cases, *direct* and *inverse*, a distinction, however, which is totally useless, and which has been avoided by some of our best modern writers; it may not, however, be amiss to explain, in this place, the difference that was formerly understood between the direct and the inverse rule of three.

The *rule of three direct*, is when more requires more, or less requires less, as in this example. If 3 men will perform a piece of work, as, for instance, dig a trench 48 yards long in a certain time, how many yards will 12 men dig in the same time? Here it is obvious, that the more men there are employed, the more work will they perform; and therefore, in this instance, more requires more. Again; if 6 men dig 48 yards in a given time, how much will 3 men dig in the same time? Here less requires less; for the less men there are employed, the less will be the work done in the same time. And all questions falling under either of these cases are said to be in the rule of three direct.

The *rule of three inverse*, is when more requires less, or less requires more, as in this example. If 6 men dig a certain quantity of trench in 14 hours, how many hours will it require for 12 men to dig the same quantity? Or thus: If 6 men perform a piece of work in 7 days, how long will 3 men be in performing the same work? These examples are both in the inverse rule; for in the first, more requires less, that is, 12 men being more than 6, they will require less time to perform the same work; and in the latter, the number of men being less, they will require a longer time. All questions of this class are said to be in the rule of three inverse. These two cases, however, as we before observed, may be included under one general rule, as follows.

Rule.—Of the three given terms, set down that which is of the same kind with the answer towards the right hand; and then consider, from the nature of the question, whether the answer will be more, or less, than this term. If the answer is to be greater, place the less of the other two terms on the left, and the remaining term in the middle; but if it is to be less, place the greater of the two given quantities on the left, and the less in the middle; and in either case, multiply the second and third terms together, and divide by the first term for the answer, which will always be of the same denomination as the third term.

R U L

Note 1.—If the first and second terms contain different denominations, they must both be reduced to the same denominations; and if the third term be a compound number, it is generally most convenient to reduce it to the lowest denomination contained in it.

Note 2.—The same rule is applicable, whether the given quantities be integral, fractional, or decimal.

Examples.

If an acre of land be worth 73*l.* 1*s.*, how much land may be bought for 250*l.* 10*s.*?

Integral.

£	s.	:	£	s.	:	Acres.
As 73	1		250	10		:: 1
20			20			
<hr/>						
1461	:		5010	:		:: 1
			1			
<hr/>						
1461	5010	(3 acres.				
	4383					
		<hr/>				
	627					
	4					
<hr/>						
1461	2508	(1 rood.				
	1461					
		<hr/>				
	1047					
	40					
<hr/>						
1461	41880	(28 $\frac{3}{4}$ perches.				
	2922					
		<hr/>				
	12660					
	11688					
		<hr/>				
	972					
		<hr/>				
	1461					

By Fractions.

As $73\frac{1}{10}$: $250\frac{1}{10}$:: 1
 Or, as $\frac{731}{100}$: $\frac{2501}{100}$:: $\frac{1}{1}$
 Whence $\frac{731}{100} \times \frac{2501}{100} \times \frac{1}{1} = \frac{1825271}{10000} =$
 3 acres, 1 rood, $28\frac{3}{4}$ perches.

By Decimals.

As 73.05 : 250.5 :: 1

 73.05)250.50(3.4291 = 3 ac. 1 r. 28.656 p.
 21915

 31350
 29220

 21300
 14610

 66900
 65745

 11550
 7305

 4245

R U L

Example 2. If 3 pounds be bought for 17*s.* how many will 170*s.* buy? Since as 17*s.* are to 170*s.* so are 3 pounds to the pounds required; the number will be found thus:

17*s.* : 170*s.* :: 3lb.

 3
 17)510(30lb.
 51

 00

Example 3. If 3 pounds and 4 ounces cost 2*s.* 4*d.* what will 2 pounds cost? The operation will be thus:

3 lb. 4 oz. : 2*s.* 4*d.*

 16 : 16 : 12

 52 : 32 : 28

 256 : 28

 64 : 28

 52)896(17*d.* $\frac{1}{3}$ of a penny.
 52

 376
 364

 12

In many cases of commerce and accounts, we have more compendious ways of working questions that come under the rule of three than by the rule itself; which, by reason of their expediting practice, are called *practise*, and constitute a particular rule of themselves.

According to the above rule, it will be observed, that the third term is of the same kind or name as the fourth term or answer, and the second of the same name with the first; so that the analogy in both pair of terms is between quantities of the same kind; which is, in fact, necessary to constitute a proportion, according to Euclid's definition: whereas, by some strange oversight, it will be found that most of our writers on arithmetic, by making the middle term like the answer, have necessarily to consider the ratio of incongruous quantities, or at least the ratio between the abstract numbers by which they are expressed.

RULE of Compound Proportion, or Double Rule of Three, or, as it is otherwise called, the Rule of Five, is the method of solving, at one operation, such questions as would require two or more statings by the common or simple rule of three.

Rule.—1. Set down the terms expressing the condition of the question, in one line. 2. Under each conditional term set its corresponding one in another line. 3. Multiply the producing terms of one line, and the produced term of the other line continually, and take the result for a dividend. 4. Multiply the remaining terms continually, and let the product of them be a divisor. 5. The quotient of this division will be the term required.

By producing terms here, are meant whatever necessarily and jointly produce any effect; as the cause and the time; length, breadth, and depth; buyer and his money; seller and his goods; all necessarily inseparable in producing their several effects.

In a question where a term is understood, and not expressed, that term may be expressed by unity.

Example.—If 250*l.* serve six persons for nine months; how long will 1000*l.* serve four persons at the same rate?

Here the terms which express the condition are,

£ Per. Mon.
250 : 6 : 9

corresponding terms 1000 : 4 : Q
where Q is put to represent the term required.

Among the conditional terms, six persons and nine months are producing, and 250*l.* is produced: among their corresponding terms, four persons and Q are producing, and 1000*l.* is produced.

But it being impossible to multiply the producing terms in the second line, and the produced in the first, because Q is unknown; therefore, multiply the producing terms of the first line by the produced in the second, and divide by the product of the rest.

$$\text{Then will } Q = \frac{6 \times 9 \times 1000}{4 \times 250} = 6 \times 9 = 54. \text{ See}$$

Mr. Dodson's Anti-Logarithmic Canon, p. 38, et seq.

But if the notion of producing and produced terms should seem obscure, those who have a knowledge of the doctrine of compound ratios will easily perceive that, in the foregoing question, Q is to 9 months in the compound ratio of four persons to six persons inversely, and of 1000*l.*

$$\text{to } 250\textit{l.} \text{ directly, that is, } \frac{Q}{9} = \frac{6}{4} \times \frac{1000}{250}, \text{ therefore } Q = \frac{6 \times 9 \times 1000}{4 \times 250} = 54, \text{ as before. And in like manner}$$

may other questions, relating to the compound rule of proportion, be stated and solved, however complex.

The above rule may be expressed somewhat simpler, as follow:

Rule 2.—Set that term, which is of the same kind with the answer, on the right, and take any two of the other given terms which are of the same name, and consider, from the nature of the question, whether, if these three were the only given terms, the answer ought to be more or less than the above-mentioned right-hand term, and arrange these two terms accordingly, as in the rule of three.

Considering still the same right-hand term as common to every stating, take two other terms which are of the same kind, and arrange them as above, according as, in this case, the answer ought to be more or less than the right-hand term; and proceed in the same manner with every pair of terms that are of the same name. Then multiply all the first terms together for a divisor, and all the other terms together for a dividend, and the quotient thence arising will be the answer sought.

Example.—If 248 men, in 5 days of 11 hours each, can dig a trench 230 yards long, 3 wide, and 2 deep; in how many days, of 9 hours each, will 24 men dig a trench 420 yards long, 5 wide, and 3 deep?

Men	24	: 248	} :: 5 days, common term.
Hours	9	: 11	
Length	230	: 420	
Width	3	: 5	
Depth	2	: 3	

$$\text{Then } \frac{248 \times 11 \times 420 \times 5 \times 3}{24 \times 9 \times 230 \times 3 \times 2} = 288\frac{2}{7} \text{ days, the term required.}$$

RULE, Central. See CENTRAL.

RULE, in a monastic sense, is a system of laws, or constitutions, by which religious houses are established and regulated; and which the religious make a vow to observe at their entrance.

The monastic rules are all to be approved of by the pope,

in order to make them valid. The rule of St. Benedict is, by some authors, called the *holy* rule.

Those of St. Bruno and St. Francis are, of all others, the most austere. See **CARTHUSIANS.**

When a religious cannot support the austerities of his rule, he sues for a dispensation.

RULE, in the *Canon Law.* The rule *de verisimili notitia, of probable notice,* in the Romish church, renders all provisions to a benefice, vacant by death, null, if it appear, that, from the day of the decease to the day of the date of the provisions, or to the day when the courier arrives from Rome, there has not been time sufficient for regular notice of the person's decease to be conveyed to the pope.

Provisions are even null, if it be proved the courier set out before the person was deceased. This rule was, according to the old constitution, strictly observed in France; in other countries the pope finds frequent occasions to dispense with it. See **PROVISIONS.**

RULE of twenty Days, Regula viginti Dierum. By this rule, if an ecclesiastic resign his benefice, to make the resignation valid, the resigner must survive its admission in the court of Rome twenty days. If he die before the expiration of the twenty days, the resignation is void, and the benefice becomes vacant by death.

This rule does not hold of the provisions of ordinary collators; nor of simple and pure resignations into the hands of the ordinary; but only in case of provisions of the pope, dispatched on resignations *in favorem.*

This rule anciently extended to such as resigned in time of health, as well as of sickness. Pope Boniface restrained it to the latter; whence it is commonly called *regula de infirmis resignantibus.*

RULE de Publicandis. By this rule, the resignee of a benefice, if he have a provision from the court of Rome, is obliged to publish the resignation, and take possession within six months; or, if he have it from the ordinary collator, within one month. Otherwise, if the resigner die, the resignation becomes null.

RULES of Court, in Law, are certain orders made, from time to time, in the courts of law, which attorneys are bound to observe, in order to avoid confusion; and both the plaintiff and defendant are at their peril also bound to pay obedience to rules made in court relating to the cause depending between them. It is to be observed, that no court will make a rule for any thing that may be done in the ordinary course; and that if a rule be made, grounded upon an affidavit, the other side may move the court against it, in order to vacate the same, and thereupon shall bring into court a copy of the affidavit and rule. On the breach and contempt of a rule of court an attachment lies; but it is not granted for disobedience to a rule, when the party has not been personally served; nor for disobeying a rule made by a judge in his chamber, which is not of force to ground a motion upon, unless the same be entered. A rule of court is granted every day, whilst the courts of Westminster sit, to prisoners of the king's bench, or Fleet prison, to go at large about their private affairs.

RULES, Clerk of the. See **CLERK.**

RULE Water, in *Geography,* a river of Scotland, which runs into the Teviot, 4 miles S.W. of Jedburgh.

RULER, PARALLEL. See **PARALLEL Ruler.**

RULLE, in *Geography,* a town of Westphalia, in the bishopric of Osnabruck; 7 miles N.E. of Osnabruck.

RUM, a species of vinous spirit, drawn by distillation from sugar-canes.

The word rum is the name it bears among the native Americans.

RUM.

Rum is very hot and inflammable, and is in the same use among the natives of the sugar-countries, as brandy among the French.

Rum differs from what we simply call sugar-spirit, in that it contains more of the natural flavour or essential oil of the sugar-cane; a great deal of raw juice, and parts of the cane itself, being often fermented in the liquor, or solution of which the rum is prepared.

The unctuous or oily flavour of rum is often supposed to proceed from the large quantity of fat used in boiling the sugar; which fat, indeed, of course, will usually give a stinking flavour to the spirit in our distillation of the sugar liquor, or wash, from our refining sugar-houses; but this is nothing like the flavour of the rum, which is really the effect of the natural flavour of the cane. The method of making rum is this:

When a sufficient stock of the materials is got together, they add water to them, and ferment them in the common method, though the fermentation is always carried on very slowly at first; because at the beginning of the season for making rum in the islands, they want yeast, or some other ferment, to make it work; but by degrees, after this, they procure a sufficient quantity of the ferment, which rises up as a head to the liquor in the operation, and thus they are able afterwards to ferment and make their rum with a great deal of expedition, and in large quantities.

When the wash is fully fermented, or to a due degree of acidity, the distillation is carried on in the common way, and the spirit is made up proof; though sometimes it is reduced to a much greater strength, nearly approaching to that of alcohol or spirit of wine, and is then called double-distilled rum. It might be easy to rectify the spirit, and bring it to much greater purity than we usually find it to be of; for it brings over in the distillation a very large quantity of the oil; and this is often so disagreeable, that the rum must be suffered to lie by a long time to mellow before it can be used; whereas, if well rectified, it would grow mellow much sooner, and would have a much less potent flavour.

The best state to keep rum in, both for exportation and other uses, is doubtless that of alcohol, or rectified spirit. In this manner it would be transparent in one-half the bulk it usually is, and might be let down to the common proof strength with water when necessary. For the common use of making punch, it would likewise serve much better in the state of alcohol; as the taste would be cleaner, and the strength might always be regulated to a much greater exactness than in the ordinary way.

The only use to which it would not serve so well in this state, would be the common practice of adulteration among our distillers; for when they want to mix a large portion of cheaper spirit with the rum, their business is to have it of the proof strength, and as full of the flavouring-oil as they can, that it may drown the flavour of the spirits they mix with it, and extend its own. If the business of rectifying rum was more nicely managed, it seems a very practicable scheme to throw out so much of the oil, as to have it in the fine light state of a clear spirit, but lightly impregnated with it; in this case it would very nearly resemble arrac, as is proved by the mixing a very small quantity of it with the tasteless spirit, in which case the whole bears a very near resemblance to arrac in flavour.

Rum is usually very much adulterated in England; some are so barefaced as to do it with malt-spirit; but when it is done with melasses-spirit, the tastes of both are so nearly allied, that it is not easily discovered. The best method of judging of it is by setting fire to a little of it; and, when it has burnt away all the inflammable part, examining the

phlegm both by the taste and smell. Shaw's Essay on Distillery.

Mr. B. Edwards, in his "History of the West Indies," vol. ii. has given the following account of the process for extracting rum from the sugar-cane, or from the very dregs and feculencies of the plant, by fermentation and distillation. He commences his account with observing, that the still-houses on the sugar-plantations in the British West Indies, vary greatly in point of size and expence, according to the fancy of the proprietor, or the magnitude of the property. In general, however, they are built in a substantial manner of stone, and are commonly equal to the boiling and curing-houses together. (See SUGAR.) For a plantation making, *communibus annis*, 200 hogheads of sugar of 1600 weight, our author conceives, that two copper stills, the one of 1200, and the other of 600 gallons, wine measure, with proportionate pewter worms, are sufficient. The size of the tanks (or tubs) for containing the cold water in which the worms are immersed, must depend upon circumstances; if the advantage can be obtained of a running stream, the water may be kept abundantly cool in a vessel barely large enough to contain the worm. If the plantation has no other dependance than pond-water, a stone tank is much superior to a tub, as being longer in heating, and if it can be made to contain from twenty to thirty-thousand gallons, the worms of both the stills may be placed in the same body of water, and kept cool enough for condensing the spirit, by occasional supplies of fresh water.

For working these stills and worms, it is necessary to provide, first, a dunder-cistern, of at least three thousand gallons; secondly, a cistern for the scummings; and lastly, twelve fermenting vats, or cisterns, each of them of the contents of the largest still, *viz.* 1200 gallons. In Jamaica, cisterns are made of plank, fixed in clay; and are universally preferred to vats or moveable vessels, for the purpose of fermenting. They are not so easily affected by the changes of the weather, nor so liable to leak as vats, and they last much longer. But in the British distilleries, fermenting cisterns, it is said, are unknown. To complete the apparatus, it is necessary to add two or more copper pumps for conveying the liquor from the cisterns, and pumping up the dunder, and also butts or other vessels for securing the spirit when obtained; and it is usual to build a rum-store adjoining the still-house.

The ingredients or materials for the process consist of melasses, or treacle drained from the sugar; scummings of the hot cane-juice, from the boiling-house, or sometimes raw-cane liquor, from canes expressed for the purpose: lees, or, as it is called in Jamaica, "dunder," from the Spanish *redunder*, the same as *redundans* in Latin; and water. Dunder, in the making of rum, serves the purpose of yeast in the fermentation of flour. It is the lees or feculencies of former distillations; and some planters preserve it for use from one crop to another; but this is said to be a bad practice. Some fermented liquor, composed of sweets and water alone, ought to be distilled in the first instance, that fresh dunder may be obtained. This is a dissolvent menstruum, and occasions the sweets with which it is combined, whether melasses or scummings, to yield a far greater proportion of spirit than can be obtained without its assistance. The water which is added acts in some degree in the same manner by dilution.

In the Windward islands, the process, we are told, is conducted as follows: the ingredients, *viz.* scummings, one-third; lees or dunder, one-third, and one-third of water, are well mixed in the fermenting cisterns, and when they are pretty cool, the fermentation will rise, in twenty-four hours,

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to a proper height for admitting the first charge of melasses, of which six gallons for every hundred gallons of the fermenting liquor, is the general proportion to be given at twice; *viz.* three *per cent.* at the first charge, and the other seven *per cent.* a day or two afterwards, when the liquor is in a high state of fermentation; the heat of which, however, should not, in general, be suffered to exceed from 90° to 94° Fahrenheit. The infusion of hot water will raise, and of cold water abate the fermentation. The quantity of melasses above-mentioned, added to a third of scummings, gives 11½ *per cent.* of sweets, six gallons of scummings being reckoned equal to one gallon of melasses. When the fermentation falls by easy degrees from the fifth to the seventh or eighth day, so as then to become fine, and throw up slowly a few clear beads or air-globules, it is ripe for distillation; though when the liquor is first set at the beginning of the crop (the house being cold, and the cisterns not saturated) it will not be fit for distillation under ten or twelve days. When this is the case, at a longer or shorter period, the liquor or wash being conveyed into the largest still, which must not be filled higher than within eight or ten inches of the brim, lest the head should fly, a steady and regular fire must be kept up until it boils, after which a little fuel will serve. In about two hours the vapour or spirit, being condensed by the ambient fluid, will force its way through the worm in the shape of a stream, as clear and transparent as crystal, and it is suffered to run until it is no longer inflammable. The spirit thus obtained is known by the appellation of "low wines." To make it rum of the Jamaica proof, it undergoes a second distillation. Between the practice of the Jamaica distillers, and that of those of the Windward islands, there is some little variation in the first process. This consists chiefly in the more copious use of dunder. As dunder serves to dissolve the tenacity of the saccharine matter, it should be proportioned, not only to the quantity, but also to the nature of the sweets. If the sweets in the fermenting cistern consist of melasses alone, which is generally the case after the business of sugar-boiling is finished, when no scummings are to be had, a greater proportion of dunder is necessary; because melasses are a body of greater tenacity than cane-liquor, and are rendered so viscous and indurated by the action of fire, as to be unfit for fermentation without the most powerful saline and acid stimulators. For the same reason, at the beginning of the

crop, when no melasses can be had, and the sweets consist of cane-juice or scummings alone, very little dunder is necessary. In such case twenty *per cent.* at the utmost will be sufficient. Dunder, in a large quantity, injures the flavour, though it may increase the quantity of the spirit. Dr. Shaw says, that the English distillers add many things to the fermenting liquor or wash, in order to augment the vinosity of the spirit, or to give it a particular flavour. He observes, that a little tartar, nitre, or common salt, is sometimes thrown in at the beginning of the operation, or in their stead a little of the vegetable or finer mineral acid. These are thought to be of great use in the fermenting of solutions of treacle, honey, and similar sweet and rich vegetable juices, which contain a small proportion of acid. A similar practice is said to prevail among the distillers in St. Christopher's, some of which consider an addition of sea-water to the fermenting liquor as a real and great improvement. Shaw recommends the juice of Seville oranges, lemons, and tamarinds, or other very acid fruits, and, above all other things, an aqueous solution of tartar; but Mr. Edwards is of opinion, that dunder alone answers every purpose. Dr. Shaw also recommends to the distiller to introduce into the fermenting cistern a few gallons of the rectified spirit, which, he says, will revert, with a large addition, to the quantity of spirit that would otherwise have arisen from the distillation. It is suggested by Mr. Edwards, that a small quantity of vegetable ashes, thrown into the rum-still, will be found serviceable. The alkaline salts are supposed to attenuate the spirit, and keep back the gross and fetid oil, which the distillers call the "faints," but if too freely used, they will also keep back a proportion of the fine essential oil, on which the flavour of the rum wholly depends. After all, the most important object of attention in making good rum is probably "cleanliness;" for all adventitious or foreign substances destroy or change the peculiar flavour of the spirit. It should, indeed, be an invariable practice with the manager or distiller to take care that the cisterns are scalded, and even cleansed with strong lime-water, every time when they are used; not merely on account of the rum, but because it has often happened that the vapour of a foul cistern has instantly killed the first person that has entered it without due precaution.

The following improved method of conducting the process, or of compounding the several ingredients, is very general in Jamaica, *viz.*

Dunder one half, or	-	-	-	-	-	50 gallons
						6 gallons
Sweets 12 <i>per cent.</i>		}	Melasses			36 gallons
			Scummings			(equal to six gallons more of melasses)
Water						8 gallons
						42 gallons.
						100

Of this mixture, or "wash," as it is sometimes called, 1200 gallons ought to produce 300 gallons of low-wines; and the still may be twice charged or drawn off in one day. The method of adding all the melasses at once, which is done soon after the fermentation commences, renders the process safe and expeditious; whereas by charging the melasses at different times, the fermentation is checked, and the process delayed.

The low-wines obtained in the manner above described, are drawn off into a butt or vessel, and, as opportunity serves, are conveyed into the second still of 600 gallons, to undergo a further distillation. The steam begins to run in about an hour and a half, and will give, in the course of

the day, 220 gallons, or two puncheons, of oil-proof rum, *i. e.* of spirit in which olive oil will sink; and thus the manufacture, if so it may be called, is complete. There will remain in the still a considerable quantity of weaker spirit, commonly about 70 gallons, which is returned to the low-wine butt. Thus 220 gallons of proof-rum are made, in fact, from 530 gallons of low-wines, or about 113 of rum from 1200 of wash. By this process the Jamaica distiller may fill weekly, working only by day-light (a necessary precaution in this employment), and at a small expence of labour and fuel, twelve puncheons of rum, containing each 110 gallons of the Jamaica standard. The proportion of the whole rum to the crop of sugar, is commonly estimated

in Jamaica as three to four. Thus a plantation, such as we have above described, is supposed to supply annually 150 puncheons of rum of 110 gallons each, or 82 gallons of Jamaica proof to each hogshead of fugar; and this quantity is sometimes fairly made from canes planted in rich and moist lands; but on a general estimate, Mr. Edwards thinks this to be too great an allowance; and that 200 gallons of rum to three hogsheads of fugar, which is in the proportion of about two-thirds rum to the crop of fugar, is nearer the truth. The following statement warrants the above conclusion. The general supply of scummings to the liquor-house is seven gallons out of every 100 gallons of cane-liquor. Supposing, therefore, that 2000 gallons of cane-juice are required for each hogshead of fugar of 16 cwt., the scummings, on a plantation making 200 hogsheads *per annum*, will be 28,000 gallons, equal to

Add the melasses from the curing-house, which, if the fugar is of a good quality, will seldom exceed 60 gallons <i>per</i> hogshead	} 12,000
Total of sweets	16,666 gallons.

This quantity, distilled at or after the rate of 12 *per cent.* sweets in the fermenting cistern, will give 34,720 gallons of low-wines, which ought to produce 14,412 gallons of good proof rum, or 131 puncheons of 110 gallons each. When a greater proportion than this is made, either the fugar discharges an unusual quantity of melasses, or the boiling-house is defrauded of the cane-liquor by improper scumming; which latter circumstance frequently happens.

It is the practice of late, we are told, with many planters, to raise the proof of rum: thus gaining in strength of spirit what is lost in quantity: and some managers make it a rule to return the scummings to the clarifiers, instead of sending them to the still-house. This last-mentioned practice reduces the crop of rum more than one-third; but is supposed to yield in fugar more than is lost in rum: and if the price of fugar is very high, and that of rum very low, it may be prudent to adopt this method.

For the duty, &c. on rum, see *Foreign SPIRITS*.

RUM, in *Geography*, a town of Tonquin, on the coast. N. lat. 19° 35'. E. long. 105° 18'.—Also, a river of America, which runs into the Mississippi, N. lat. 45°. W. long. 93° 48'.

RUM, one of the Hebrides, or Western islands of Scotland, is situated to the westward of the isle of Skye, and is comprised, politically, in the parish of Small-Isles, and in the county of Argyle. It derived its name from the Gaelic, *Rhum*, signifying extent, in allusion to its being the largest island in the parish to which it belongs. It is computed to measure eight miles in length, and nearly the same in breadth; and to contain about 22,000 square acres. Rum is in general rugged, mountainous, and barren, and more adapted for pasturage than for agriculture. Horses are reared in this island for sale, and though diminutive in size, are remarkably high mettled and hardy. Here are likewise reared a considerable number of sheep, which are the best stock with which a mountainous country, like Rum, can be supplied. The general breed is a small white-faced sheep, which is much praised, both for the delicate flavour of its flesh, and for the excellence of its wool. This island formerly abounded with deer; but that animal is now totally extirpated, owing to the copse wood, which served as a cover to their fawn, having been destroyed. Before the use of fire-arms, the method adopted by the inhabitants to kill deer was so sin-

gular as to deserve notice. On each side of a glen formed by two mountains, stone dykes were constructed at a considerable height up the hills, and extended from thence to the lower part of the valley, always drawing nearer to each other, till they approached within three or four feet. This narrow pass opened into a circular space, inclosed by a wall of sufficient height to restrain the deer, which were pursued hither and destroyed. The remains of one of these ancient deer-traps are still to be traced. Birds of prey are numerous in Rum; and there are likewise a few grouse, pigeons, terragants, and wild ducks, besides those birds which frequent the island only at stated seasons of the year. The air of Rum, from its proximity to the western ocean, is moist, and the weather extremely rainy. The only harbour here is Loch-Serefort, which penetrates a considerable way into the island, on its eastern coast. It is spacious, its ground good, and its depth of water from five to seven fathoms. Near the head, on the south side of this harbour, a pier has been lately erected. The general appearance of Rum is, that the land slopes towards the east; but on the west presents precipices of a tremendous height. At the base of the hill Sgormor are found abundance of agates, of that species called by Cronstedt "*Achates chalconians*," improperly white cornelians. Here are several remarkable strata; such as grey quartz; a mixture of quartz and basalt; a black stone spotted with white, like porphyry, but with the appearance of lava; fine grit or free-stone; and the cinereous indurated bole of Cronstedt. There being no mill in this island, the corn is "gradanned," or burnt out of the ear, instead of being thrashed. This is performed in two ways: first by cutting off the ears and drying them in a kiln, and then setting fire to them on the floor, and picking out the grains; and secondly, by burning the sheaf entire, which is a most ruinous practice, as it destroys both thatch and manure. Gradanned corn is conjectured to have been the parched corn of holy writ.

Rum not being a parish of itself, its population is not stated in the parliamentary returns; but it is estimated to contain about 500 inhabitants. The Statistical Account of Scotland, by Sir John Sinclair, bart. 8vo. vol. xvii. 1796. Beauties of Scotland, vol. v. 8vo. 1808. Carlisle's Topographical Dictionary, 4to. 1813.

RUM Key. See RONCADOUR.

RUMAHIE. See ROMAHIE.

RUMB, RUM, or *Rhumb*, in *Navigation*. See RHUMB.

RUMB-Line, or *Loxodromia*. See RHUMB-Line.

RUMBLE, in *Geography*, one of the smaller Shetland islands; two miles S. of Yell. N. lat. 60°. W. long. 0° 56'.

RUMBURG, a town of Bohemia, in the circle of Leitmeritz, in which are considerable manufactures of linen; nine miles N.N.E. of Kamnitz.

RUMEIL, a town of Asiatic Turkey, in the province of Diarbekir; 30 miles E. of Nisbin.

RUMELY, a town of Syria, in the pachalic of Tripoli, on the coast; 15 miles S. of Bairut. N. lat. 33° 33'. E. long. 35° 28'.

RUMEN, the first stomach of animals which chew the cud, and which are hence called *ruminants*.

The food is transmitted into the rumen without any other alteration in the mouth than being a little rolled and wrapped up together.

For an account of the rumen, see *Anatomy of MAMMALIA*.

RUMEX, in *Botany*, the Dock and Sorrel genus; named, as it seems, by the Latins themselves, from *rumex*, a sort of pike, spear, or halberd, which the shape of the leaves, in various

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various species, much resembles. We cannot but prefer this etymology to that taken from *rumo*, to suck, by which the acid flavour of Sorrel, useful in allaying thirst, was supposed to be indicated.—Linn. Gen. 178. Schreb. 238. Willd. Sp. Pl. v. 2. 249. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 318. Sm. Fl. Brit. 390. Prodr. Fl. Græc. Sibth. v. 1. 244. Brown Prodr. Nov. Holl. 421. Pursh 247. Juss. 82. Lamarck Illustr. t. 271. Gærtn. t. 119. (Lapathum; Tourn. Inst. 504. Acetosa; ibid. 502. t. 287.)—Class and order, *Hexandria Trigynia*. Nat. Ord. *Holeraceæ*, Linn. *Polygonæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of three obtuse, reflexed, permanent leaves. *Cor.* Petals three, ovate, similar to the calyx, but larger, converging, permanent, forming valves over the seed. *Stam.* Filaments six, capillary, very short; anthers erect, of two lobes. *Pist.* Germen superior, triangular, turbinate; styles three, capillary, reflexed, projecting between the petals; stigmas large, lacinated. *Peric.* none, the converging, triangular, hardened corolla, enfolded the seed. *Seed* solitary, triangular.

Ell. Ch. Calyx of three leaves. Petals three, converging, permanent. Seed solitary, triangular, superior, without a seed-vessel. Stigmas many-cleft.

Obf. *R. digynus* excludes one-third in the number of every part of the fructification, except the stamens. Those species which compose the Sorrel tribe, have flowers with stamens on one plant, flowers with pistils mostly on another, being dioecious, or in some instances monoecious. *R. spinosus* is monoecious; and the perianth of the female flowers becomes hooked and rigid. *R. alpinus* is polygamous. In several species the petals are distinguished by a tumid, hard, mostly coloured, grain, or roundish tubercle, at the back, most conspicuous when the seed ripens; sometimes of equal size in all, sometimes obsolete in two of the petals. This is a genus of hardy, perennial, almost invariably herbaceous plants, nearly allied to *Rumex*; see that article. They have small pretensions to be considered as ornamental, and, on the contrary, are generally esteemed weeds, because they mostly grow where they are a nuisance and encumbrance. The agriculturist stigmatizes with the name of Docks, all large, biennial or perennial, strong-rooted, rank-growing herbs, and generally pays for their extirpation, according to a settled rate, under that denomination. The roots of the various species of *Rumex* are astringent; their herbage is likewise often so, though sometimes very acid. Every part of the plant is greenish, with a strong tendency to become red by age. Botanists differ about the denomination of the parts of the flower. Analogy and theory teach the whole of the integuments in this genus and *Rheum* to be a calyx; but the three inner divisions in *Rumex* having a separate insertion, somewhat of a different texture or structure, and being so remarkably altered, in most species, as the fruit ripens; while in such species as have, after flowering, an enlarged or hardened calyx these inner segments remain unchanged, never undergoing any alteration in concert with the three outer segments; all this evinces that nature is not always conformable to our rules. The genus *Rumex* therefore is one of those in which we are obliged to use our discretion, as to the denomination of the *calyx* and *corolla*, in spite of arbitrary and absolute principles.

The species in Willdenow amount to 36. They are in general well defined, but several are misunderstood, or given twice; so that we must exhibit as compendious a view as possible of the whole, having also some to add. Eleven are natives of Britain. The Hortus Kewensis enumerates 27, two of which do not occur in Willdenow. They are commodiously disposed in three sections.

Sect. 1. *Stamens and pistils in the same flowers. Valves distinguished by a granular tubercle.*

1. *R. Patientia*. Patience Dock or Rhubarb. Linn. Sp. Pl. 476. Willd. n. 1. Ait. n. 1. Ehrh. Pl. Off. n. 273. (Hippolapathum fativum; Ger. Em. 389. H. hortense; Matth. Valgr. v. 1. 407.)—Flowers united. Valves entire, ovate; one of them minutely granular. Leaves ovato-lanceolate, taper-pointed.—Native of Italy. Long cultivated in kitchen or rustic gardens, having been sometimes used as a pot-herb, and the root occasionally employed as a purgative medicine, in the place of Rhubarb. Hence it is sometimes called Monk's Rhubarb, though that name is now retained rather for the *Rumex alpinus*. The *Patientia* is four or five feet high, erect, smooth, green; its leaves from twelve to eighteen inches long, rather narrow. Flowers in whorled or tufted clusters, copious, pendulous. Petals large, ovate, reticulated with veins; the midrib of one of them swelling, in its lower part, into an oblong, not very evident, grain. We now rather prefer the above cut of Gerarde, to that of Dodonæus cited by Linnæus.

2. *R. sanguineus*. Bloody-veined Dock. Linn. Sp. Pl. 476. Willd. n. 2. Ait. n. 2. Pursh n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1533. (Lapathum fativum sanguineum; Ger. Em. 390.)

β. *R. acutus*; Curt. Lond. fasc. 3. 21, the description, not the figure. (*R. Nemolapathum*; Ehrh. Phytoph. n. 94. Linn. Suppl. 212. Bloodless Dock; Petiv. H. Brit. t. 2. f. 6.)—Flowers united. Valves entire, oblong; one of them chiefly granular. Leaves lanceolate, heart-shaped at the base.—Native of Europe, in woods and by way sides. Dr. Sibthorp found it in Greece, and though not very common in England, it occurs in various parts. Mr. Pursh says it grows in shady woods and moist meadows, from Pennsylvania to Virginia, flowering in June and July. The green variety, *β*, is very common in England, under the shade of trees in rather dry woods. Perhaps it ought to be esteemed the original species; the kind whose stalks and veins contain a crimson juice, being perhaps the variety. This last appears, by Gerarde's herbal, to have been first known here as a pot-herb. Linnæus mentions Virginia only as its native country, and marks it as biennial. With us both varieties are certainly perennial. The plant is erect, three or four feet high, branched, rather slender, and of a delicate appearance. Flowers small, in long clusters of very numerous tufts or whorls; their petals oblong and obtuse, one of them bearing an extremely large, globular, red grain.

3. *R. spatulatus*. Spatulate Cape Dock. Thunb. Prodr. 67. Willd. n. 3.—“Leaves obovate, obtuse. Valves granular.”—Found by Thunberg at the Cape of Good Hope.

4. *R. crispus*. Curled Dock. Linn. Sp. Pl. 476. Willd. n. 7. Ait. n. 3. Pursh n. 2. Fl. Brit. n. 2. Engl. Bot. t. 1998. Curt. Lond. fasc. 2. t. 20. (Lapathum longifolium crispum; Munt. Brit. t. 104.)—Flowers united. Valves ovate, wavy, entire, all granular. Leaves lanceolate, undulated, acute.—In waste ground, pastures, and by way sides, common throughout Europe, as well as in North America, flowering in June and July, and accidentally throughout the summer. This is a very troublesome and unprofitable weed; readily distinguished, as a species, from all other English Docks, by the curved leaves, and large entire valves, each bearing an ovate grain. These are by accidental error termed *calyx-valves* in *English Botany*. The root is tap-shaped, yellowish. Stem two or three feet high, branched, nearly smooth to the touch. Leaves of a lightish green. Clusters rather long; leafy in their lower part.

5. *R. verticillatus*. Whorled American Dock. Linn. Sp.

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Sp. Pl. 476. Willd. n. 4. Pursh n. 3.—Flowers united. Valves somewhat deltoid, entire, all granular. Leaves flat, lanceolate; with tubular, membranous sheaths embracing the stem. Clusters nearly leafless.—In rivulets and shady woods, from Canada to Virginia, flowering in July, perennial. *Pursh*. The stem is somewhat zigzag, ascending, angular and furrowed, smooth, invested above every leaf with a tubular, pale, membranous, intrafoliateous *stipula*, or sheath, near an inch long. Leaves flat and even. Flowers twice the size of the last, with very large oblong grains, which are often wrinkled. The *petal* itself is also strongly marked with projecting reticulated veins:

6. *R. Britannica*. Virginian Water-Dock. Linn. Sp. Pl. 476. Willd. n. 5. Pursh n. 4.—Flowers united. Valves ovate, obtuse, all granular. Leaves flat, lanceolate; with scarcely any sheaths. Clusters paniced, leafless.—Near rivulets in Virginia and Carolina; perennial, flowering in June and July. *Pursh*. This is readily distinguished from the last, with which Linnæus sometimes negligently confounded it, notwithstanding his own clear definition. The want of the tubular sheathing *stipulas* is alone sufficient. The grains on the *valves* are, moreover, much smaller, and Mr. Pursh has well adverted to the paniced inflorescence, composed of numerous, lax, many-flowered *clusters*. The specific name *Britannica*, not *britannicus*, alludes to former controversies, of Muntingius and others, about what was the true *Herba Britannica*; but why this American plant should be so called, we know no good reason, nor is it worth while to examine which of the bad figures in the verbose and useless author last named, is most, or least, like our plant. None of them, we believe, is properly referrible to it. The *Herba Britannica* of the ancients is said to have been a powerful antiscorbutic, or tonic, and was found on our own, or the neighbouring, coasts.

7. *R. perficarioides*. Perficaria Dock. Linn. Sp. Pl. 477. Willd. n. 9. Ait. n. 4. Pursh n. 5.—Flowers united. Valves lanceolate, taper-pointed, toothed, all granular. Leaves lanceolate, wavy, nearly entire.—In shady wet woods, on the banks of ditches, in Virginia and Carolina, flowering in July, annual. Sent to Kew in 1773, by the chevalier Murray, professor at Gottingen, but we presume it is scarcely preserved, being so like our common docks, except the advantage, in this case, of having only an annual root. The *clusters* are accompanied, at each whorl, with a stalked leaf, rather smaller than those on other parts of the branched stem. Flowers small, erect. Valves narrow, with long slender points, and each bearing a large, oblong, slightly kidney-shaped, smooth, tawny grain.

8. *R. crispatus*. Crisped Dock. Michaux Boreali-Amr. v. 1. 217. Pursh n. 6.—Flowers united. Valves heart-shaped, obtuse, three-toothed at each side; two of them granular. Clusters leafless. Leaves crisped and wavy at the margin; the lower ones oval; upper lanceolate.—Native of Kentucky. *Michaux*. Akin to the last. Its habit is said to be like *R. acutus*, but the *valves* investing the *seed* are much larger. One of them bears no granular tubercle, and the grains of the two others are unequal in size. The upper *leaves* are minutely crenulated.

9. *R. aegyptiacus*. Egyptian Dock. Linn. Sp. Pl. 477. Willd. n. 10. Ait. n. 5. (*Lapathum aegyptium* annuum, parietariae folio, capsulâ feminis longius barbata; Till. Pif. 93. t. 37. f. 1.)—Flowers united. Valves with three very long capillary points at each side; one only bearing an ovate grain. Gathered near Memphis, by J. B. de Georgis, surgeon to the grand duke of Tuscany, whence it was introduced into the garden at Pisa, and soon after, as it appears, sent to Miller at Chelsea. The root is an-

ual. This species is readily known by the fine capillary teeth of its *valves*, spreading in every direction, and giving the *clusters*, which are long, dense, and leafy, a hairy appearance. Each *valve* is small, reticulated with strong veins.

10. *R. dentatus*. Sharp-toothed Dock. Linn. Mant. 226. Syst. Veg. ed. 13. 284. Willd. n. 11. Ait. n. 6. (*Lapathum aegyptium*, capsulâ feminis albâ et crenatâ; Boerh. Ind. Alt. v. 2. 85. Dill. Elth. 191. t. 158. f. 191.)—Flowers united. Valves with awl-shaped teeth; all granular. Clusters dense, leafy. Leaves lanceolate.—Gathered in Egypt, by the unfortunate Augustin Lippi, afterwards murdered by the barbarians of Nubia. This plant was originally confounded, by Linnæus, with the last, from which it differs essentially, having *valves* thrice as large, bordered with awl-shaped teeth, scarcely exceeding their own length, each valve bearing a large, pale, ovate grain.—The plant is annual, a span high, branched from the bottom.

11. *R. maritimus*. Golden Dock. Linn. Sp. Pl. 478. Willd. n. 12. Ait. n. 7. Fl. Brit. n. 6. Engl. Bot. t. 725. (*Lapathum anthoxanthum*; Bauh. Hist. v. 2. 987.)—Flowers united. Valves deltoid, with setaceous teeth; each bearing a nearly cylindrical grain. Clusters dense. Leaves linear.—Native of marshes in various parts of Europe, chiefly near the sea. It is perennial, flowering in July and August. This is most akin to *R. aegyptiacus*, with which its dense leafy *clusters*, and tawny or golden hue, agree. But the *foliage* is more linear, and the teeth of the *valves*, though almost capillary, not one-third so long, while the valves themselves are larger, and every one of them marked with a *grain*, which is oblong, and nearly cylindrical, not ovate. The stem is strongly angular and furrowed, roughish, reddish, a little zigzag. Leaves stalked, bluntish, flat. Whorls very dense, and crowded into cylindrical leafy clusters, often of a rich golden hue. Seed very small, compared with our common docks.

12. *R. palustris*. Yellow Marsh Dock. Fl. Brit. n. 7. Engl. Bot. t. 1932. Ait. n. 8. (*R. maritimus*; Ehrh. Herb. n. 74. Curt. Lond. fasc. 3. t. 23. *Lapathum aquaticum*, luteolâ folio; Bocc. Mus. v. 2. 143. t. 104. *Hydrolapathum minus*; Lob. Ic. 286. Ger. Em. 309.)—Flowers united. Valves lanceolate, toothed at the base; each bearing an oblong grain. Leaves linear-lanceolate. Whorls distant.—Native of marshes, ditches, and wet waste places in Germany, Italy, and England. Found in several situations near London; also at Acle and Saham in Norfolk. It is perennial, flowering in July and August. Many botanists have confounded this with the last, from which it differs in having distant leafy whorls, and lanceolate *valves*, each furnished at the base, on each side, with three slender teeth, much shorter than the foregoing. The *leaves* are linear-lanceolate and acute; the radical ones very large. Stem furrowed, reddish, rough to the touch. The root, as Curtis observed, is red internally.

13. *R. divaricatus*. Spreading Italian Dock. Linn. Sp. Pl. 478. Willd. n. 13. Ait. n. 10. (*Lapathum arvense subhirsutum*, folio retuso, caule longius brachiato, capsulâ feminis crenatâ; Till. Pif. 93. t. 37. f. 2.)—Flowers united. Valves heart-shaped, toothed, granular. Leaves heart-shaped-oblong, obtuse, downy.—Native of fields in Italy. Root annual. Linnæus truly says, that Haller considered this as the same with *R. pulcher* hereafter described. We have seen no specimen; but though in Tilli's figure the *valves* investing the *seed* are not very unlike those of *pulcher*, the large oblong leaf, not at all contracted in the middle, and hairy as well as its footstalk, has

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has a very different appearance. Moreover, this species is cultivated at Kew, where it was introduced in 1793, by Mr. Hunnemann, and is published by Mr. Aiton as distinct. It flowers in July and August. See *R. auratus*, n. 30.

14. *R. acutus*. Sharp Dock. Linn. Sp. Pl. 478. Willd. n. 14? Ait. n. 11. Fl. Brit. n. 3. Engl. Bot. t. 724.

β. *Lapathum acutum minimum*; Dill. in Raii Syn. 141. Bauh. Hist. v. 2. 985. (Small Sharp Dock; Petiv. H. Brit. t. 2. f. 4.)—Flowers united. Valves oblong, obscurely toothed, each bearing a roundish prominent grain. Leaves oblong, pointed; somewhat heart-shaped at the base. Clusters leafy.—Native of marshy meadows in England, and other parts of Europe, perennial, flowering in July. The stem is erect, or somewhat zigzag, angular, furrowed, smooth to the touch. Leaves narrow; the lower ones only slightly heart-shaped; all smooth and flat. Branches elongated into long spreading clusters, consisting of numerous, distinct, and rather distant whorls, each of which is accompanied by a small, lanceolate, stalked leaf. The flowers are occasionally polygamous, and some of the males have been observed by Mr. Sowerby to be furnished with twelve stamens; the greater part of the flowers however have usually six only, in the same calyx with the pistil. The seed is small. Valves oblong and bluntish, mostly entire, though sometimes toothed at the base, each of them bearing a large, red, almost globular grain, of the same size in all.

This is a species about which there has been more doubt and controversy than any other. Most botanists have mistaken for it our green variety of *R. sanguineus*, n. 2, and we can by no means be certain how far Mr. Curtis has committed the same error. The two plants however are perfectly distinct, nor is there any uncertainty in the characters by which we have defined them. The present has a large grain on each valve, and the whorls are most of them, if not all, accompanied by a leaf. The other has two of the valves without grains, the third bearing a very large one, and there is only a leaf or two, here and there, at the lower whorls; the long series of them above being leafless. By an attention to this last character, the figures of old authors, bad as they are, may be determined. With respect to Mr. Curtis's fine plate, we confess we remain in uncertainty. His clusters are almost leafless, like the *sanguineus* β, but his separate flowers unquestionably belong to the *acutus*. We have no doubt that he confounded these species, and that his expression of two of the valves being "generally naked," is calculated to square with both. Two of them are really in *sanguineus* always naked, nor do we find any uncertainty in this character.

15. *R. obtusifolius*. Broad-leaved Dock. Linn. Sp. Pl. 478. Willd. n. 15. Ait. n. 12. Pursh n. 7. Fl. Brit. n. 4. Engl. Bot. t. 1999. Curt. Lond. fasc. 3. t. 22. (L. sylvestre, folio minus acuto; Ger. Em. 388. Lob. Ic. 285.)—Flowers united. Valves toothed; one principally grained. Radical leaves heart-shaped, obtuse. Stem roughish.—A common and troublesome weed throughout Europe, flowering in July and August. The long, perennial tap root runs deep into the ground, and is yellowish, not red, within. Stems numerous, two or three feet high, furrowed; roughest in the upper part. Radical leaves very large and spreading; wavy, more or less blunt, not unlike those of horse-radish, but hardly so big; their footstalks long and channelled. Stem leaves much narrower and more pointed, on shorter stalks, somewhat crisped and crenate. Clusters

generally bearing a few leaves, though often destitute of any. Seed large. Valves rather large, oblong-heart-shaped, entire at the extremity, but having three sharp prominent teeth near the base. The outermost bears an oblong grain, smaller in proportion to the valve than in most of the foregoing, and the grains of the two other valves are hardly discernible.

Mr. Curtis recommends frequent mowing as a sure means of destroying this dock. Mr. Pursh speaks of it as a common weed in old pastures and gardens in North America, though probably introduced from Europe.

16. *R. pulcher*. Fiddle Dock. Linn. Sp. Pl. 477. Willd. n. 16. Ait. n. 13. Fl. Brit. n. 5. Engl. Bot. t. 1576. (*Lapathum pulchrum bononiense sinuatum*; Bauh. Hist. v. 2. 988. Fiddle Dock; Petiv. H. Brit. t. 2. f. 10.)—Flowers united. Valves many-toothed; one of them bearing a larger grain than the rest. Radical leaves fiddle-shaped. Stem smooth, straggling.—Native of dry gravelly pastures, and waste ground, in the more temperate parts of Europe, from England to Greece; perennial, flowering in August. The radical leaves, so remarkably contracted in one part as to resemble a fiddle; the widely spreading, almost horizontal, stems and branches; and the sharp numerous teeth of the strongly reticulated valves, clearly mark this species. The outer valve bears an oblong reddish grain, larger than what usually occurs on the others. Seed very smooth and polished, with thin acute angles. A small leaf accompanies each whorl, though sometimes scarcely longer than the flower. The petals are larger and more coloured in some Swiss specimens, than we have noticed them in the flowering state of our English plants. Willdenow repeats under this species the synonym of Tilli, which properly belongs to *R. divaricatus*; apparently on the authority of Willich. See our remarks under n. 13.

17. *R. aquaticus*. Great Water Dock. Linn. Sp. Pl. 479. Willd. n. 18. Ait. n. 9. Pursh n. 8. Fl. Brit. n. 8. Engl. Bot. t. 2104. Ehrh. Pl. Off. n. 114. (*R. Hydrolapathum*; Hudf. 154. Willd. n. 6. Woodv. Med. Bot. t. 178. *R. acutus*; Ehrh. Pl. Off. n. 104. *Lapathum*, n. 1588; Hall. Hist. v. 2. 271. *Hydrolapathum magnum*; Lob. Ic. 285. Ger. Em. 389.)—Flowers united. Valves ovate, almost entire, bearing small or obsolete grains. Leaves lanceolate, acute; the lower ones heart-shaped at the base.—Native of ditches, pools, and the borders of rivers, throughout Europe; as well as in North America, from Pennsylvania to Virginia, but, according to Mr. Pursh, not common. With us it is very plentiful and conspicuous, being by far the largest of our docks, and flowering in July and August.—The root is large, knobby, and perennial. Stems erect, four or five feet high, angular, and strongly furrowed. Leaves a foot long, (more or less,) coriaceous, smooth, with a glaucous hue, entire, sometimes minutely curled at the edge. Clusters branched, dense, mostly leafless. Flowers numerous, on slender drooping stalks. Valves ovate, veiny, entire, or very sparingly notched, each bearing an ovate grain, various in size, or sometimes having only a tumid rib. The former is usually the case with our British plant, and is conspicuous in Ehrhart's Pl. Off. n. 114, which he gives as *R. aquaticus* of Linnæus from Upsal; while his n. 104, without grains, is marked, certainly erroneously, *acutus* of Linnæus, and is likewise from Upsal. The authentic Swedish specimen, in the Linnæan herbarium, precisely resembles the first of these in habit, while its valves, having scarcely any indications of grains, agree with those of the latter. We believe the presence or absence of grains, in this case, does not afford a specific difference. Hence, however, it readily appears

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why authors have been led to describe the same plant twice, and to confound its synonyms.

SECT. 2. *Stamens and pistils in the same flowers. Valves naked, or without grains.*

18. *R. bucephalophorus*. Basil-leaved Dock. Linn. Sp. Pl. 479. Willd. n. 17. Ait. n. 14. Cavan. Ic. v. 1. 31. t. 41. f. 1. Sm. Fl. Græc. Sibth. t. 345, unpublished. (*Acetosa ocimi folio neapolitana βασιφαληφορα*; Column. Ecphr. part 1. 151. t. 150.)—Flowers united. Valves naked, veinless, with hooked teeth. Flower-stalks ternate, roughish; dilated and vaulted when in fruit.—Native of Italy, Barbary, and the Levant. Common in spring in the corn-fields of Greece and the neighbouring islands, according to Dr. Sibthorp, who judged it to be *λαπαθον το μικρον* of Dioscorides. It is annual, and has been occasionally raised in our gardens for near 150 years past, for the sake of its curious and singular structure. The root is fibrous. Herb very variable in luxuriance; sometimes simple, two or three inches high; sometimes branched from the base into several ascending, leafy, simple stems, flowering almost all the way up. Leaves stalked, ovate, or spatulate, smooth, entire. Stipulas membranous, white, long, and taper-pointed. Flowers always three together, in a series of whorls, partly axillary, but chiefly leafless. Flower-stalks deflexed, red, roughish with minute granulations, as well as the tawny or reddish calyx and petals. The latter are three-lobed, and become ovate pointed valves, each beset at the margin, on each side, with about three awl-shaped, hooked teeth or spines. As the fruit advances, each flower-stalk becomes lengthened, and dilated towards the calyx, being convex above, and vaulted underneath, not properly, as Linnæus says, “plane,” neither is it tumid or club-shaped. Columna, by a stretch of fancy, compares the valves in fruit to a bull’s head, two segments of the reflexed calyx looking like horns.

19. *R. fimbriatus*. Fringed New Holland Dock. Brown n. 1.—“Flowers united. Valves naked, veiny, fringed with hooked teeth. Flower-stalks reflexed and thickened when in fruit.”—Gathered by Mr. Brown, near Port Jackson, New South Wales. We have seen no specimen. This species seems very nearly akin to the last.

20. *R. vesicarius*. Bladder Dock, or Sorrel. Linn. Sp. Pl. 479. Willd. n. 20. Ait. n. 16. (*Acetosa americana, foliis longissimis pediculis donatis*; Bauh. Prodr. 54. Morif. sect. 5. t. 28. f. 7. A. vesicaria peregrina; Bell. Hort. Eyf. vern. ord. 6. t. 15. f. 3.)—Flowers united. Stalks mostly in pairs. All the valves very large, membranous, entire, folded back. Leaves undivided.—Native of Africa. A hardy annual in our gardens, where it appears to have been first cultivated by Tradescant, in 1656. It flowers in July and August. The stem is branched, from a span to 18 inches high, smooth. Leaves on long stalks, ovate and obtuse, but with two angles at the base, so as to approach a halberd-shape. The plant is chiefly remarkable for the beauty of its large shining membranous valves, reticulated with veins, and tinged with a light rose-colour. These invest the ripe seed, hanging on capillary drooping stalks in great abundance. The figure in the *Hortus Eystelensis* is much the best, were it not so difficult of access, on account of the unweildiness, and bad arrangement, of that pompous old book.

21. *R. roseus*. Rose-coloured Dock. Linn. Sp. Pl. 480. Willd. n. 21. Ait. n. 17. Sm. Fl. Græc. Sibth. t. 346, unpublished. (*Acetosa ægyptia, roseo feminis involucro, folio lacero Lippi*; Shaw Specim. n. 5. t. 1?)—Flowers united. Valves unequal, membranous, rounded, reticulated, toothed. Leaves undivided.—Native, as it is

said, of Egypt. Dr. Sibthorp found it in the isle of Cyprus, and his fine figure is the only good one we have met with; for the miserable sketch of Shaw appears certainly to have been taken from the *tingitanus*, with whose leaves it accords, though not with those of *roseus*; yet from this plate it seems Linnæus borrowed a part of his character, “*foliis erosis*,” which does not agree even with his own poor specimen. The true *roseus*, from a simple annual root, throws up several spreading, ascending, leafy stems, near a span high. Leaves on long stalks, undivided, entire, of an oblong, slightly hastate figure, but much narrower than in the last species. The whole herb is roughish, with a sort of hoary mealiness. Flowers, as well as their stalks, and the valves investing the seed, of an elegant rose-colour; the lobes of the valves semi-orbicular, membranous, strongly reticulated with red veins, and bordered with fine sharp teeth.

22. *R. tingitanus*. Taugier Dock. Linn. Sp. Pl. 479. Willd. n. 22. Ait. n. 18. (*Acetosa dentata perpetua di Tauger*; Zanou. It. 14. t. 5. (*Lapathum maritimum fœtidum*; Bauh. Prodr. 56.)—Flowers united. Valves heart-shaped, obtuse, membranous, entire. Leaves hastate, ovate, jagged.—Native of Barbary, Spain, and Cyprus. Hardy in our gardens, flowering from June to August.—Root perennial, creeping. Stems about a foot high, ascending, branched. Leaves on long stalks, roughish, consisting of a large, ovate, acute, central lobe, with two small transverse ones at the base; all crisped or jagged at the edges, sometimes pinnatifid. Flowers in long clusters, two or three together, with a membranous bractea under them. Valves not half the size of the two last, whitish and shining. Shaw’s figure, cited under *roseus*, exactly represents this species, and we find Desfontaines has removed it hither.

23. *R. scutatus*. French, or Garden, Sorrel. Linn. Sp. Pl. 480. Willd. n. 23. Ait. n. 19. (*Acetosa rotundifolia hortensis*; Morif. sect. 5. t. 28. f. 9. *Oxalis franca feu romana*; Ger. Em. 397.)—Flowers united. Leaves hastate, somewhat heart-shaped. Stem round. Native of Switzerland, the south of France, and some parts of Germany, in stony places. Cultivated for the use of the table, in every kitchen-garden, since the days of Gerarde. It is a perennial herb, flowering in June and July. The leaves are very smooth and rather glaucous, quite entire, supported by long stalks. Their flavour is very gratefully acid, either recent or stewed. Flowers small, racemose, pendulous. Valves orbicular, entire.

R. glaucus, Jacq. Ic. Rar. t. 67, is a more glaucous and small-leaved variety, whose stem is said to be in some degree woody.

24. *R. nervosus*. Three-ribbed Dock. Vahl. Symb. v. 1. 27. Willd. n. 24. (*R. persicarioides*; Forsk. Ægypt. Arab. 76.)—Flowers united. Valves orbicular, entire, naked. Leaves oblong, three-ribbed. Gathered by Forskall, on the mountains of Hadi, in Arabia. The stem is rather shrubby, with round striated branches. Leaves stalked, oblong; the uppermost lanceolate; all of them acute, entire, fleshy, very smooth, glaucous, an inch or more in length, with three ribs, but no veins. Stipulas membranous, sheathing, abrupt. Panicle terminal. Flower-stalks capillary, thickened under the flower, longer than the fruit. Calyx reflexed. Valves orbicular, smooth, without grains. Vahl.

25. *R. dignus*. Mountain Sorrel. Linn. Sp. Pl. 480. Willd. n. 25. Ait. n. 20. Pursh n. 9. Fl. Brit. n. 9. Engl. Bot. t. 910. Fl. Dan. t. 14. (Welsh Sorrel; Petiv. H. Brit. t. 3. f. 4.)—Flowers united. Styles two. Valves ovate, entire, naked. Leaves broadly emarginate.—Native of Alpine rivulets, on the mountains of Lapland, Labrador,

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Labradore, Siberia, Switzerland, Wales, Scotland, and the north of England, always in very elevated spots, at least in our island, flowering in June. The leaves are nearly all radical, on long stalks, kidney-shaped, an inch wide, wavy, veiny, pale green, acid, each terminating in a broad shallow notch. Stem a span high, panicle. Flower-stalks in small groups or tufts, capillary. Valves ovate, emarginate, entire, reddish, with no traces of grains. The flowers, having but two styles, afford a decisive specific character of themselves, as well as an excellent name. The segments of the calyx are but two, as well as the petals, or valves. The seed is orbicular and flattish, having a broad border.

26. *R. lanceolatus*. Lanceolate Cape Dock. Thunb. Prodr. 67. Willd. n. 26.—“Leaves lanceolate, with a reflexed border. Stem angular.”—Found by Thunberg at the Cape of Good Hope. We have never seen it.

27. *R. graminifolius*. Grass-leaved Sorrel.—Leaves linear, entire, very narrow. Stipulas sheathing, imbricated. Panicle angular.—Native of Siberia. Communicated by professor Rudolph to A. B. Lambert, esq. under the above name, which very aptly describes the numerous, long, grassy leaves. The stem seems shrubby. Flowers small, in a forked racemose panicle. Our specimen is not perfect enough to shew whether the stamens and pistils are in the same flower or not, neither are the valves discernible. We therefore merely mention here, for further enquiry, this very curious and distinct species, of which we find no published account.

SECT. 3. Perfect stamens and pistils in separate flowers.

28. *R. Lunaria*. Tree Sorrel. Linn. Sp. Pl. 479. Willd. n. 19. Ait. n. 15. (*R. polygamus*; Cavan. Ic. v. 1. 14. t. 22. *Acetosa arborefcens*, subrotundo folio; Pluk. Almag. 8. Phyt. t. 252. f. 3.)—Flowers monoecious. Males with twelve stamens. Anthers oblong. Females with six abortive ones. Valves rounded, granular. Stem shrubby. Leaves slightly heart-shaped.—Native of the Canary islands, from whence it was brought into the English green-houses, as soon as tender exotics became much cultivated. It flowers in June and July. The stem is shrubby, branched, spreading, often reddish. Leaves alternate, on longish stalks, fleshy, entire, smooth, of a pale glaucous hue and acid taste. Stipulas sheathing, broad, membranous, whitish. Flowers in a large, terminal, branched, racemose panicle; their particular structure Cavanilles first explained, and we have nearly verified his description. He knew not that his was a Lianæan plant, nor did the editors of Hort. Kew. discover his synonym. Some flowers are entirely male, with a three-cleft calyx, three very minute unchangeable petals, and twelve stamens, whose anthers are divided half way down. Other flowers, in the same panicle, have a similar calyx and petals, but the latter are subsequently enlarged into three orbicular, emarginate, veiny valves, each bearing a small grain. These flowers have mostly the rudiments of six stamens, but entirely ineffectual, hardly visible to the naked eye. We presume the large capillary tufts, described by Cavanilles, are the real stigmas, the styles being bent down to the bottom of the flower, as in many other species, with whole stigmas these plumose tufts exactly accord. But this we have not ascertained, as yet, in the living plant. Considering the present species as in fact monoecious, not polygamous, we have removed it to this section.

29. *R. hastulatus*. Little-halberd-leaved Sorrel.—Flowers separated, dioecious? Anthers orbicular. Stem shrubby, angular. Leaves halberd-shaped, revolute. Gathered by Mr. Menzies in Chili. The stem is woody, with numerous,

long, lax, zigzag, angular branches. Leaves half an inch long, or rather more, entire, minutely roughish, obtuse, tapering at the base into a footstalk, about half their own length. Stipulas short, membranous, obtuse. Flowers in solitary, terminal clusters, with a concave, thick, permanent bractea, and several minute membranous ones, under each little assemblage of three partial stalks. Segments of the calyx, as well as the petals, concave, reflexed. Stamens six, shorter than the calyx. Anthers of two round lobes, opening externally. We can discover no other than male flowers.

30. *R. auratus*. Golden-flowered Dock. (Favrodine dorée; Reynier Mém. de la Société de Lausanne, v. 2.)—Flowers separated, dioecious? Stamens nine or twelve. Anthers oblong. Petals none in the male. Stem herbaceous, angular. Leaves ovato-lanceolate, somewhat crenate, with hairy ribs.—Native of Switzerland. Reynier, Davall. First found by M. Favrod, in a meadow not far from the village of Castrod. M. Reynier, who conceived this plant to form a distinct genus from *Rumex*, on account of the want of petals, and the super-abundance of stamens, named it as above. His own specimen, now in our hands, and those of Mr. Davall, are entirely male. We have never seen either female flowers, or fruit; nor can we find any indication of this *Rumex* in Haller, or elsewhere. The habit of the herb bears a general resemblance to our common Docks, *acutus*, *crispus*, &c. The stem is angular, and strongly furrowed, paneled above, with long leafless clusters of innumerable small male flowers, of a green and tawny hue, on drooping capillary stalks. The leaves are lanceolate, ovate, or somewhat heart-shaped; their ribs, veins, and long footstalks, hairy. This last character induces a suspicion that the plant before us may possibly be the male of *R. divaricatus*, n. 13, a species concerning which very little is known, and which Haller, on the authority of Willch, reports to have, on cultivation, become the same as *pulcher*. Our *auratus* indeed is distinct from *pulcher*, but may be a variety of *divaricatus*, become occasionally dioecious, if it be not always so. The three segments of the calyx are spreading, linear, keeled and channeled, rather shorter than the anthers, which are cloven at the top.

31. *R. alpinus*. Alpine Dock, or Monk's Rhubarb. Linn. Sp. Pl. 480. Willd. n. 27. Ait. n. 21. (*Lapathum folio rotundo, alpinum*; Bauh. Hist. v. 2. 987. *Hippolapathum rotundifolium*; Ger. Em. 389.)—Flowers monoecious, or polygamous. Valves entire, naked. Leaves heart-shaped, obtuse, rugose.—Native of the alps of Switzerland, France, and Savoy, as well as of Greece and the Bithynian Olympus, flowering in July. Cultivated ever since Gerarde's time in our gardens, where it thrives, even in the smoke of London, and makes a very handsome appearance with its ample rich-green foliage. The root is thick, certainly perennial, though Linnæus and Willdenow mark it as biennial, and is said to possess the medical virtues of Rhubarb; in a weaker degree. Footstalks very long. Stipulas membranous, sheathing. Stem two feet high, erect, leafy, round, furrowed, smooth. Clusters forming an oblong, dense, leafy panicle, of innumerable green flowers, some of which have stamens with a, usually imperfect, germen; others are entirely female. Valves heart-shaped, strongly reticulated with veins; their midrib a little tumid, but not granular. Seed small.

32. *R. spinosus*. Prickly-seeded Dock. Linn. Sp. Pl. 481. Willd. n. 28. Ait. n. 22. Sm. Fl. Græc. Sibth. t. 347, unpublished. (*Beta cretica, semine aculeato*; Bauh. Prodr. 57. *B. cretica, semine spinoso*; Bauh. Hist. v. 2. 963.)—Flowers monoecious. Calyx of the females of one leaf

leaf, pitcher-shaped, with three spreading spinous points. Stem decumbent. Leaves slightly hastate.—Native of Gibraltar, Zante, Crete, and the neighbourhood of Athens; also of the Cape of Good Hope; cultivated here in 1656, by Tradescant. This is a prostrate, annual, widely spreading, and rank-growing herb, with the aspect and green hue of some kind of Beet. The *branches* are zigzag, round, striated. *Leaves* stalked, spreading, about two inches long and one broad, entire and smooth. Tufts of female *flowers* sessile, axillary; those of the males much fewer, leaflets, about the ends of the branches, stalked and drooping. *Calyx* and *petals* of the latter alike, concave, obtuse, equal. *Stamens* six. *Calyx* of the former triangular, with six ribs, and curious depressions between; the three segments spreading, heart-shaped, folded, spinous-pointed, finally very hard and rigid. *Petals* small, oblong, triangular, erect, permanent, but scarcely enlarged, the body of the *calyx* enclosing the *seed*. This singular species, in its *fruit*, as well as habit, approaches the nature of *Beta* and *Spinacia*.

33. *R. giganteus*. Tall Dock. Ait. n. 23.—“Flowers monoecious. Valves naked. Leaves oblong-ovate.”—Native of the Sandwich islands, from whence it was brought by Mr. Menzies, in 1796. It is a perennial green-house plant, flowering from June to August. Aiton.

34. *R. tuberosus*. Tuberous-rooted Dock. Linn. Sp. Pl. 481. Willd. n. 29. Ait. n. 24. Sm. Fl. Græc. Sibth. t. 348, unpublished. (*Oxalis tuberosa radice*; Bauh. Hist. v. 2. 991. Ger. Em. 396.)—Flowers dioecious. Valves naked. Leaves oblong-arrow-shaped; their lobes spreading. Root with oval knobs.—Native of Italy, Asia minor, and the islands of Cyprus and Lemnos. Miller is said to have cultivated this species, but it seems now lost. The *root* is perennial, with oval or oblong knobs, like those of *Spiræa Filipendula*. *Stems* a foot high. *Leaves* entire, with two divaricated lobes or points at the base, smooth. *Clusters* paniced, of an elegant rose-colour, especially when ripening *seed*. *Antlers* orange. *Stigmas* pink. *Valves* orbicular, obtuse; heart-shaped at the base, without *grains*.

35. *R. Acetosa*. Common Sorrel. Linn. Sp. Pl. 481. Willd. n. 31, excluding the last variety. Ait. n. 25. Fl. Brit. n. 10. Engl. Bot. t. 127. Woodv. Med. Bot. t. 69. (*Oxalis*, five *Acetosa*; Ger. Em. 396.)—Flowers dioecious. Valves granular. Leaves oblong-awl-shaped; their lobes converging, often notched.—Native of grassy pastures throughout Europe, from the alps of Lapland to Greece, flowering early in June. The *root* is perennial, tapering, running deep into the ground, tufted at the top, and throwing up several *stems*, one to two feet high, round, simple, leafy, striated. *Leaves* deep green, paler beneath; the lower and radical ones stalked; the upper sessile, somewhat revolute, clasping the stem; the points at the base of all rather directed inward than otherwise, and not in any degree divaricated; their edges nearly entire, or slightly crisped. *Stipules* long, tubular, jagged at the summit. *Clusters* compound or aggregate, whorled, reddish. *Flowers* drooping, completely dioecious. *Petals* in both oblong-ovate, larger than the *calyx*, which latter is reflexed when in fruit. *Valves* ovate, obtuse, entire, each bearing an ovate *grain*. Linnæus in Fl. Lapp. ed. 2. 99, and Dillenius in Raii Syn. ed. 3. 143, mention a large alpine variety, for which the former cites Muntingius, (*de vera herba Britannica*.) *Acetosa Hispanica maxima*, 225. t. 213. This author's plant seems rather the *arifolius* hereafter described, which we can scarcely believe to have been found either in Lapland or Merionethshire. *R. Acetosa* tastes gratefully acid, with a pleasant and wholesome astringency. It is, ac-

ording to Linnæus, much used by the Laplanders for preparing a kind of whey from rein-deer's milk, which will keep a long time, and is in great request among people of all ages.

36. *R. Acetofella*. Sheep's Sorrel. Linn. Sp. Pl. 481. Willd. n. 32. Ait. n. 26. Pursh n. 10. Fl. Brit. n. 11. Engl. Bot. t. 1674. Curt. Lond. fasc. 5. t. 29. (*Oxalis tenuifolia*; Ger. Em. 397. *O. five Acetosa minor*; Matth. Valgr. v. 1. 406.)—Flowers dioecious. Valves naked. Leaves lanceolate-hastate.—Native of barren sandy or gravelly pastures and fields, throughout Europe, flowering in June and July. This is but half the size of the last, more slender in every part, and more of a red or tawny colour. The *root* is perennial and creeping. *Leaves* numerous; the radical ones hastate, their transverse lobes spreading at right angles with the central lobe, narrow and entire; stem-leaves often undivided. *Clusters* paniced, numerous. *Valves* ovate, nearly entire, all destitute of *grains*. The herb is acid.

37. *R. multifidus*. Many-cleft Sorrel. Linn. Sp. Pl. 482. Willd. n. 30. Sm. Fl. Græc. Sibth. t. 349, unpublished. (*R. Acetofella* §; Linn. Sp. Pl. 482. *Acetosa minor erecta, lobis multifidis*; Bocc. Mus. v. 2. 164. t. 126. Tourn. Inst. 503.)—Flowers dioecious. Leaves lanceolate-hastate; their side lobes palmate.—Native of Italy, Sicily, and the Levant. Dr. Sibthorp gathered it on the hills of Greece, as well as near Constantinople. Linnæus seems never to have seen it, and has fallen into a strange error, in quoting Boccone's synonym for two different things, within four or five lines. This Willdenow did not presume to correct, but aggravated the error by one figure. He reminds us of the very submissive young man, who saw Rousseau eat the berries of *Hippophæe*, without daring to tell him they were reputed poisonous. The present species differs from the last merely in the divisions of its side lobes. We have never seen its *valves*, but the *flowers* are exactly like *Acetofella*, of which it may possibly be a variety.

38. *R. bidens*. Toothed-valved Sorrel. Brown n. 2.—“Flowers separated. Valves naked, hastate. Leaves linear-lanceolate, tapering at the base.”—Gathered by Mr. Brown, in Van Diemen's island. Whether this be dioecious or monoecious is not expressed.

39. *R. aculeatus*. Prickly-valved Sorrel. Linn. Sp. Pl. 482. Willd. n. 33. Sm. Prodr. Fl. Græc. Sibth. v. 1. 249. (*Acetosa cretica, femine aculeato*; Bauh. Prodr. 55. *Oxalis minor aculeata Candizæ*; Bauh. Hist. v. 2. 991.)—Flowers monoecious. Leaves lanceolate, stalked. Fruit reflexed. Valves fringed with hooked prickles.—Native of Spain, Crete, Greece, and the neighbourhood of Constantinople. A very curious little perennial species, somewhat like *Acetofella* in herbage, except that the *leaves* are more glaucous, and simply lanceolate, not hastate. The *clusters*, or *spikes*, are solitary at the top of each branch, and look at first sight like those of some *Reseda*. *Flowers* small, monoecious in both the Linnæan specimens, though on one there are more males, on the other more females. The latter are strongly curved downwards. *Valves* ovate, curiously fringed with rigid, hooked, or forked, prickles; some are furnished with a small *grain*.

40. *R. luxurians*. Spreading Cape Sorrel. Linn. Mant. 64. Suppl. 212. Willd. n. 34. (*R. sagittatus*; Thunb. Prodr. 67. *Acetosa montana pumila, fegopiri folio*; Bocc. Mus. v. 1. 165. t. 126?)—Flowers monoecious. Leaves hastate, taper-pointed; somewhat heart-shaped. Stem much branched, angular, diffuse. Valves orbicular, naked.—Native of the Cape of Good Hope, according to a speci-

RUMEX.

men from Dr. Bladh, in the Linnæan herbarium. The synonym of Boecone, which surely can have nothing to do with this plant, caused it to be thought of Italian origin. Linnæus cultivated it at Upsal, and we have a specimen from the Paris garden, but our English cultivators seem to know nothing of this *Rumex*. The root is tuberous like *Spiræa Filipendula*, or *R. tuberosus*, n. 34, and, of course, perennial. *Stems* many, twelve or eighteen inches long, prostrate, branched, zigzag, leafy, marked with five angles, and striated. *Leaves* on long stalks, very acid, purplish at the margin, waved, but scarcely crenate; their form triangular, with taper spreading points; their length an inch and a half or two inches; and they are cut away at the base, up to the side ribs. *Clusters* terminal, numerous, composing a large spreading panicle, with fine, capillary, single-jointed partial stalks. *Flowers* certainly monoecious in the above-mentioned specimen, the only one we have seen; the males towards the extremity of the clusters. *Calyx* in both sexes oblong, incurved, concave, obtuse. *Petals* larger, orbicular, reddish. *Stamens* six, with oblong cloven anthers. *Valves* twice as large as the permanent inflexed calyx, orbicular, finely reticulated, and, as far as we can discover, destitute of grains. It might puzzle any reader to determine what the younger Linnæus meant, in the *Supplementum*, by the inner and outer valves. The latter are the calyx, but there is no authority, nor analogy, to justify his phraseology, nor is the calyx awl-shaped. We are enabled to solve Willdenow's difficulty concerning *R. spinosus* of Thunberg, as we have the real *spinosus* from the Cape, and the present plant answers so exactly to his *sagittatus*, a species apparently overlooked by Willdenow.

41. *R. arifolius*. Great Arum-leaved Sorrel. Linn. Suppl. 212. Willd. n. 35. Ait. n. 27. Allion. Pedem. v. 2. 204? (*R. abyssinicus*; Jacq. Hort. Vind. v. 3. 48. t. 98. *Acetosa montana lato ari rotundo folio*; Bocc. Mus. v. 1. 165. t. 125? see also t. 126.)—Flowers dioecious. Leaves all stalked, hastate, with simple divaricated lobes. Valves heart-shaped, rounded, naked, entire.—This species is reported to have been brought from Abyssinia by Mr. Bruce, as every thing communicated by that celebrated traveller was, at one time, supposed to have been; just as the gardeners have since attributed every new plant, even the Great Barbary Oat, to Botany Bay. We can scarcely doubt that Allioni's is the same species, for few plants vary more surprizingly in luxuriance than we have seen this; and if so, *R. arifolius* is a native of the Alps. We gathered it by the great high road over Mount Cenis, in 1787. To prevent mistakes, we shall describe our specimens, and leave our readers to observe how nearly they agree with Jacquin's luxuriant garden ones, which he says were from six to nine feet high. *Root* perennial. *Stems* from three to five feet high, erect, simple, leafy, somewhat angular, strongly furrowed, smooth, light green, often reddish. *Leaves* of a light bright green, not of the deep hue of *R. Acetosa*, from two to four inches long, sometimes more, oblong inclining to ovate, with two spreading, acute, entire lobes at the base, very variable in size. *Footstalks* very long in the lower and radical leaves, and scarcely entirely wanting in the uppermost. *Clusters* numerous, forming a large, terminal, compound, leafless panicle of innumerable, very small, green flowers, male on one plant, female on another. *Calyx* of the latter reflexed, permanent. *Valves* thrice as large, pale brown, tinged with pink, membranous, without grains, finely reticulated, nearly orbicular, wavy, but not crenate. *Seed* pale brown, above half the length of the valves, its angles sharp and greatly compressed. It must be observed that though Jacquin's figure, which is far from exquisitely

finished, seems to indicate grains on the valves, his description says there are none. We are not very doubtful of Boccone's synonym, as his figures are generally diminished, and our plant is so variable in size.

42. *R. bipinnatus*. Cut-leaved Sorrel. Linn. Suppl. 211. Willd. n. 36.—Flowers dioecious. Leaves doubly pinnatifid.—Native of Morocco, in sandy ground, according to a specimen in the Linnæan herbarium, the only one we have seen, which is just about flowering, and seems entirely male. *Stem* ascending, about a span long, simple, leafy, angular, striated, smooth. *Leaves* an inch or more in length, apparently very fleshy, heart-shaped, deeply pinnatifid almost to the mid-rib; their segments deeply, irregularly and obtusely subdivided, so that the whole leaf bears some resemblance to various species of PELARGONIUM; see that article. *Footstalks* about equal to the leaves, or longer. *Stipulas* large, membranous, pale, ovate, acute, sheathing at the base. *Clusters* composing a terminal panicle, with large shining bracteas, resembling the stipulas. *Calyx* of three roundish, concave, membranous-edged leaves. We can scarcely discern even the rudiments of petals. *Stamens* six, with oblong, reddish, cloven anthers.

43. *R. hostilis*. Armed, or Prickly Dock. Loureir. Cochinch. 217.—Flowers dioecious. Leaves lanceolate, entire. Stem prickly. Valves naked.—Native of Cochinchina, where it is called *Cây diều gai*. The stem is three feet high, erect, round, prickly. Leaves flat, spreading. Flowers spiked. Valves all without grains, entire, smooth, unarmed. Seed triangular. Petals three, greenish. Loureiro.

The author last named has a *R. crispus*, found near rivers in Cochinchina, which he mentions as eatable. This is very unlikely to be our Linnæan *crispus*, especially as he says each valve bears three bristles, nor was he at all acquainted with European plants, except from description. Still we dare not, without specimens, adopt the species in question as a new one.

RUMEX, in Gardening, contains plants of the herbaceous, perennial, and woody evergreen kinds, of which the species cultivated are, the common sorrel (*R. acetosa*); the French sorrel (*R. scutatus*); the patience dock, or rhubarb (*R. patientia*); the bloody-veined dock, or bloodwort (*R. sanguineus*); and the tree sorrel (*R. lunaria*).

In the first species the whole herb is acid, with a degree of astringency not unpleasent or unwholesome. It is often cultivated as a culinary herb. And there is a variety of it with broad leaves, termed great mountain sorrel.

The second sort, which is called round-leaved sorrel, is a more grateful acid than the first kind, and of course preferred for kitchen use, in soups, &c.

Method of Culture.—The first and second sorts and varieties of these plants may be increased by seed and parting the roots, but more particularly the first, as the latter may be very readily increased by the roots. The seeds should be sown in a bed or border in the early spring, as March, raking them in evenly. When the plants come up, they should be regularly thinned, and when of some growth, in the summer, be planted out in rows on a bed or border, about eight or nine inches apart in the common sort, and, in the other a foot or more, watering them well; when they will be proper to cut the latter end of the same summer and in the autumn, continuing for several years; but as the seedling plants in the first kind mostly produce larger leaves than the older plants, fresh supplies should be raised annually, or every other year. And the parted roots may be planted out in the same season, or in autumn, in rows a foot apart, giving them a good watering when they grow readily

and furnish leaves in the latter end of summer and in the autumn. The second sort is readily raised in this way. They afterwards only require to be kept clean, and to have the feed-stems cut down in the summer, as well as the rank leaves in the autumn, that more full supplies of fresh leaves may be afforded.

And the third and fourth sorts may be raised also from seeds in the same way, and the former from offsets of the root planted out in the autumnal season; when they grow very readily.

The last sort is easily increased by cuttings of the young shoots in the spring and summer months, being planted in pots at the former season, plunging them in a hot-bed; but in the latter they succeed without artificial heat, either in pots or the natural ground, being occasionally shaded and watered; when they become well rooted by the autumn. The third and fourth sorts afford variety in the clumps and borders, and the last among the green-house collections of plants.

RUMEX, in the *Materia Medica*. The root of the *R. aquaticus*, or water-dock, has scarcely any smell; it has a strong austere taste, strikes a black colour in a solution of ferrum vitriolatum, or ferri sulphas, and yields its active matter both to water and to rectified spirit. All the lapathæ were formerly officinal herbs. Their name is derived from *λαπάθω, ενάσις*, and they are alluded to by Horace in the following lines:

“ — Si dura moralitur alvus,
Mitulus et viles pellent obftacula conchæ
Et lapathi brevis herba.” Sat. 4. l. 2. v. 27.

The water-dock has been esteemed to be the most efficacious. The leaves, which manifest considerable acidity, are said to possess a laxative quality, and have therefore been used to relieve costiveness; the roots are strongly astringent, and have been much employed, both externally and internally, for the cure of scurvy, especially when the gums are spongy, and frequent hemorrhages supervene. It is also recommended in various other cutaneous dejections, and in visceral obstructions: and in order to give it additional importance, Muntingius has laboured to prove that this hydrolapathum is the “Herba Britannica” of the ancients; but many medical men still think that this root does not peculiarly differ from other astringents, and are so sceptical, as not to place any faith in the great virtues ascribed to it by Muntingius and Sir John Hill; so that it is now scarcely ever employed. The powdered root is said by Murray to be an excellent dentifrice. The leaves of the *R. acetosa*, or common sorrel, have an agreeable acid taste, like that of oxalis acetosella, or wood-sorrel, which this plant resembles in its medical properties; and as it is easily procured in great abundance, may be substituted for it. (See *OXALIS*.) Sorrel, taken in considerable quantity, or used variously prepared as food, will undoubtedly be found beneficial, where a refrigerant and antiscorbutic regimen is required; and Linnæus informs us, that the Laplanders experience “ferum acetosatum” to be in this respect an useful and pleasant diet. The acidulous taste of sorrel-leaves is said to depend on the presence of superoxalate of potash, which they contain. The leaves are diuretic as well as refrigerant. Their expressed juice diluted with water, or a decoction of them in whey, affords an useful drink in cases of inflammatory fever; and eating them in large quantities daily as a salad, may prove serviceable in some cutaneous affections. In France the plant is cultivated for the use of the table. Woodville. Thomson.

RUMFORD, in *Geography*. See **ROMFORD**.

RUMFORD, a town of America, in Cumberland county, Maine, on the N. bank of Androscoggin river, about 80 miles N.W. of Portland. The township is about eight miles square, seven of which lie N. of Androscoggin river, which meanders through it about twelve miles; about a mile from its E. line there is a large fall. Ellis’s river runs through it on the west side.

RUMFORD. See **CONCORD**.

RUMI, in the *Materia Medica*, a name given by Avicenna and Serapio to mastic of the finer kind. They distinguish this drug into two sorts; the one called by this name *rumi*, which was white and pure; the other called *cupis*, which was foul and blackish; the former came from the island of Chios, the latter from some parts of Ægypt.

RUMI Ramba, in *Geography*, a plain near Quito, in Peru, full of large fragments of rocks, thrown thither from a volcano, formerly in the famous mountain of Pichincha.

RUMIGNY, a town of France, in the department of the Ardennes, and chief place of a canton, in the district of Rocroy; 12 miles S.W. of Rocroy. The place contains 779, and the canton 8944 inhabitants, on a territory of 230 kilometres, in 27 communes.

RUMILLY, a town of France, in the department of Mont-Blanc, and chief place of a canton, in the district of Annecy; 7 miles W.S.W. of Annecy. The place contains 2757, and the canton 13,585 inhabitants, on a territory of 197½ kilometres, in 26 communes.

RUMINANT, **RUMINANS**, in *Natural History*, an animal which chews over again what it has eat before: this is popularly called “chewing the cud.”

Joah. Con. Peyer has an express treatise “De Ruminantibus et Ruminacione,” where he shews, that there are some animals which do really ruminate, such as oxen, sheep, deers, goats, camels, hares, and squirrels; whereas others only appear to ruminate, which he calls *ruminantia spuria*; of which number are moles, crickets, bees, beetles, crabs, mullets, and several other fishes.

This latter class, he adds, have the stomachs composed of muscular fibres; by means of which the food is ground up and down, much as in real ruminants.

Ruminants, Mr. Ray observes, are all quadrupedal, hairy, and viviparous; some with hollow and perpetual horns, others with deciduous ones. See **QUADRUPEDS**.

The horned ruminants have all four stomachs appropriated to the office; viz. 1. The *κοιλία μίστη* of Aristotle, the *rumen*, *venter magnus*, or what we call the *paunch*, or *inward*, which receives the meat slightly chewed, retains it awhile, and then delivers it back again into the mouth, which is what we call the *cud*, to be re-chewed. 2. The *κεκευσαλος*, or *reticulum*, which we call the *honeycomb*, from its internal coat being divided into cells like honeycombs. 3. The *εχινος*, which Mr. Ray thinks has been wrongly translated *omasus*, and which he chooses to call the *echinus*: this being difficult to clear, our people throw it away, and call it the *manifold*. 4. The *ουτρη* of Aristotle, by Gaza called the *abomasus*; and, among us, the *maso*.

Again, all the horned ruminant animals want the dentes primores, or broad teeth in the upper jaw; and they afford that hard kind of fat called *fuet*, *sebum*, *σιαις*, which is firmer and less liquefiable in them than the adeps of other animals. See *Anatomy of MAMMALIA*.

It is remarked by Mr. Feron, that the retrograde motion of the œsophagus in ruminating cattle, such as cows, sheep, goats, &c. renders them capable of bringing up the softened grafs from their first stomach. But when these animals fill themselves too full of clover, or of wet grafs, or of some other young vegetables, which are liable to run into fermentation,

tation, the stomach becomes distended with air, and death frequently ensues. See CUD and HOVEN.

Great care is therefore to be taken with all these sorts of animals when they are first turned into rich full grassed pastures, to see that they do not stay in them too long at a time, or fill themselves too full of such rich food. They are best and safest when only put into them for a short period at any one time, on being first turned upon them. And the properest season for them, as well as the grass, is probably to consume it when it is in the dry state, as when eaten while very wet, there may be injurious consequences in both ways.

RUMINATIO, in *Medicine*, which literally signifies *chewing the cud*, is applied by analogy to express one of the symptoms of indigestion, nearly allied to *rudation*, when the stomach, by repeated spasmodic efforts, throws up into the mouth, not only flatus and some of its secretions, but portions of the undigested food. Dr. Cullen defines *dyspepsia*, or indigestion, by enumerating this among other symptoms by which it is, in different instances, characterized. "Anorexia, nausea, vomitus, inflatio, ructus, *ruminatio*, &c." See his *Synops. Nosolog. Method. Gen. 45.* See RUCTATION, INDIGESTION, &c.

RUMINATION, in *Comparative Physiology*, a technical term equivalent to the common phrase of "chewing the cud." It denotes the ascent of the food from the paunch, or first stomach, into the mouth, and the second mastication which it there undergoes; a process confined to those mammalia which have complicated stomachs. When this second mastication has been accomplished, the food descends, not into the paunch, which receives it when it is first swallowed, but into the second stomach; and thence successively into the third and fourth. The mechanism, by which the animal has the power of conveying its food either into the paunch or the second stomach at will, as well as the structure of the stomach of ruminating animals altogether, is described in the article MAMMALIA. It is a singular example of voluntary power over the motions of an organ, which in other respects and in other animals are completely involuntary. "The influence of the will," says Blumenbach, "in the whole affair of rumination, is incontestible. It is not confined to any particular time, since the animal can delay it according to circumstances, when the paunch is quite full. It has been expressly stated of some men, who have had the power of ruminating (instances of which are not very rare), that it was quite voluntary with them. I have known two men who have ruminated their vegetable food: both assured me that they had a real enjoyment in doing this, which has also been observed of others: and one of them had the power of doing it or leaving it alone, according to circumstances." *Comparative Anatomy*, p. 138, note.

The final purpose of rumination, says the same author, as applicable to all the animals in which it takes place, and the chief utility of this wonderfully complicated function in the animal economy, are still completely unknown: what has been already suggested on these points is quite unsatisfactory. Fabricius ab Aquapendente has sufficiently refuted the old dream of Aristotle and Galen, that rumination supplied the place of incisor teeth, the materials of which are applied in these animals to the formation of horns. Perreault and others supposed that it contributed to their security; as they eat much, and are timid, they supposed it removed the necessity of their remaining long employed in chewing in an open pasture. But the Indian buffalo ruminates, although it does not fly even from a lion, but rather attacks, and often vanquishes that animal. And the wild goat dwells in alpine countries, which are inaccessible to beasts of prey. *Comparat. Anat. loc. cit.*

RUMMAGE, probably derived from the Saxon *raum*, *room*, or *space*, in the *Sea Language*, signifies to clear a ship's hold, or to remove goods or luggage from one place to another.

RUMMEL, in *Geography*, a river of Algiers, which passes by Constantina, and afterwards joins the Wed el Kib-beer, 18 miles N.W. of Constantina.

RUMMELSBURG, a town of Farther Pomerania, situated on the Wipper; 25 miles S. of Rugenwalde. N. lat. 53° 55'. E. long. 65° 53'.

RUMNEY. See ROMNEY.

RUMNEY, or *Romney Marsh*, a tract of land in the county of Kent, (see ROMNEY,) governed by certain ancient and equitable laws of sewers, composed by Henry de Bathe, a venerable judge in the reign of king Henry III. who granted a charter to this district, empowering twenty-four men, thereunto chosen, to make distresses equally upon all those which have lands and tenements in the said marsh, to repair the walls and water-gates of the same, against the dangers of the sea. The commissioners of sewers, in other parts of England, may act according to the laws and customs of Rumney Marsh, or otherwise, at their own discretion; subject to the discretionary revision of the court of king's bench.

RUMNEY, or *Romney*, a township of New Hampshire, America, in Grafton county, on a north branch of Baker's river, about 7 or 8 miles N.W. of Plymouth, on the W. side of the Pemigewasset, incorporated in 1767, and containing 765 inhabitants.

RUMOUR, in *Law*. Spreading false rumours is criminal, and punishable at common law.

RUMP of a Bird. See UKRIGIUM, and *Anatomy of Birds*.

RUMPHIA, in *Botany*, was inscribed by Linnæus to the memory of George Everard Rumph, M.D. counsellor to the Dutch East India Company, whose remembrance must ever be dear to all students of tropical botany, for the sake of his *Herbarium Amboinense*. This work, of seven volumes folio, was the fruit of his long residence, and great authority, in Amboyna, nor does it, as a store of faithful practical information, fall short of any performance of the kind. It has indeed some of the faults, or rather misfortunes, of a posthumous publication; and the reader must always keep in mind that the figures, far inferior to those of the *Hortus Malabaricus*, are generally not more than half the size of nature. The original drawings, still in existence, are said to be very fine. The author was born at Hanau in 1637, and died in 1706. His ardour for natural science rose above the most formidable obstacles, such as the loss of sight, at forty-three years of age, and the destruction by fire of all his papers and collections, seven years afterwards. He published at Amsterdam, in 1706, a splendid and excellent work on shells in Dutch, and is said to have left behind him, in manuscript, a political history of Amboyna. Happy were it if his gentle and benevolent spirit tended, in any way, to meliorate the cruel and sordid policy of his countrymen there, or any where else! He was a member of the Imperial Academy *Naturæ Curiosorum*, and well designated by that body, according to their customary mode, as the Indian Pliny.—*Linn. Gen. Pl. 23.* Schreb. 31. Willd. *Sp. Pl. v. 1.* 187. Mart. *Mill. Dict. v. 4.* Vahl. *Enum. v. 2.* 36. Juss. 370. Lamarck *Illustr. t. 25.*—*Class and order, Triandria Monogynia. Nat. Ord. Tricocca, Linn. Terebintaceæ?* Juss.

Gen. Ch. *Cal.* Petianth inferior, of one leaf, three-cleft, erect, flat. *Cor.* Petals three, oblong, obtuse, equal, much exceeding the calyx. *Stam.* Filaments three, awl-shaped,

the length of the corolla; anthers small. *Pist.* Germen superior, roundish; style awl-shaped, the length of the stamens; stigma triangular. *Peric.* Drupa coriaceous, turbinate, with three furrows. *Seed.* Nut ovate, undivided, of three cells.

Eff. Ch. Calyx three-cleft. Petals three. Drupa coriaceous. Nut of three cells.

1. *R. amboinensis.* Linn. Sp. Pl. 49. (Tsjem-tani; Rheede Hort. Malab. v. 4. 25. t. 11. *Myxa* pyriformis, officulo trispermo; Raii Hist. v. 2. 1556.)—Native of wild stony sandy places, in the hills of Parakaroo, and other parts of the country of Malabar, flowering in December, and bearing fruit in January, which remains long on the branches. This is a tree of vast size, with a thick trunk, and rough bark. Leaves evergreen, scattered, stalked, heart-shaped, pointed, sharply crenate, with five radiating branched ribs, roughish and hairy; dark green on the upper side; paler beneath. Flowers white, in axillary clusters. They are represented with a hairy tubular calyx, and three seeming bractees at the base; but the latter appear to be what Linnæus describes as the calyx. We have seen no specimen, nor do we know whence he formed his generic description, which certainly does not accord, in the last-mentioned respect, with Rheede's plate. The aromatic, acceftent, or somewhat acrid, qualities attributed to the plant by this writer, justify Jussieu's opinion of its natural affinities. The specific name, *amboinensis*, is either incorrect, or must have been founded on the authority of a specimen from Amboyna, seen perhaps by Linnæus, but of which no record remains.

RUMPNEY, in *Geography*. See **REMNEY**.

RUMSEY. See **ROMSEY**.

RUMZE, a river of Moravia, which runs into the Marfch, 15 miles S. of Olmutz.

RUN of a Ship, so much of her hull as is always under water; growing thinner and lankier by degrees, from the floor-timber to the stern-posts.

This is also called the *ship's way astward*.

A ship is said to have a *good run*, when it is long, and the water passes easily to her rudder, her tuck not lying too low, which is of great importance to her sailing. If the water do not come strongly to her rudder, by reason of her being built too broad below, she cannot steer well; and a ship that cannot steer well, cannot keep a good wind, nor will have any fresh way through the sea, but will always be falling to leeward.

And yet a ship with a large and good run loses much stowage, because it is made narrow below.

RUN, in the *Manege*. To run a horse is to put him to his utmost speed. Some use the word *running* for any kind of gallop.

RUN Out, in *Agriculture*, a provincial term applied to land that is exhausted. It also signifies to *sprout* as corn in a wet harvest; and likewise to *scour*, as in the cases of cattle.

It is a very bad and mischievous practice, though one which is too much indulged in by farmers in many places, to suffer lands to be quite run out, as they are very difficult, troublesome, and expensive to bring into order again; and in a great many cases, it is almost impossible ever to restore them to the same state of cultivation they were in before such injuries happened to them. As such ill consequences are, therefore, not unfrequently caused in an intentional manner, it may be necessary to provide against them by the insertion of suitable clauses in leases.

RUNS, a term used for the lines of planks on which the navigators wheel their barrows, when employed in the

excavation of a canal. In some instances the same term has been applied to inclined planes.

RUNACHUSAN, in *Geography*, a small island near the W. coast of Scotland. N. lat. 58° 13'. W. long. 5° 4'.

RUNAN, a town of Prussia, in Ermeland; 4 miles N.W. of Heilsberg.

RUNAWAY BAY, a bay on the N.W. coast of the island of Antigua, between the fort on Corbizon's point N., and fort Hamilton S.—Also, a bay on the N. coast of Jamaica, W. of Great Laughlands river and Mumby bay, and 9 or 10 miles E. of Rio Bueno. N. lat. 18° 30'. W. long. 77° 11'.

RUNAWAY, Cape, a cape on the E. coast of New Zealand; so called by Cook in 1769, from the hasty retreat of the enemy, after having threatened hostilities. S. lat. 37° 32'. W. long. 181° 48'.

RUNCARIA, in our *Old Writers*, signifies land full of brambles and briars. (1 Inst. 5.) The word comes from the Latin *runca*, a weed.

RUNCATION, a term used in the *Ancient Husbandry* to express the clearing away the weeds from among the corn, and other sown plants.

They used, when the corn or other plants were an inch or two high, to draw a sort of rake or harrow over the ground indiscriminately over the corn and weeds, and when this was done, a person followed over all the field, and picked up all the weeds with the hand: the treading down the young corn, however, by this person's feet, and the injury done to it by the rake, were so great, that the crop always suffered greatly by it; and many of the Romans chose to omit the use of the rake or harrow, as a thing that did as much injury to the corn as to the weeds, and contented themselves with the sending a person to pick up the weeds without it.

This was a sort of first hint to the horsehoeing husbandry of the moderns; though so injudiciously managed, that it was of very little, if any use, in this its infancy. But had these farmers been instructed to sow their corn in rows, and then to use the rake or harrow, as we do the hoe, only between those rows, they would then have had all the advantage of destroying weeds by it, and of stirring the earth, and no injury would have been done to the crop. See **HUSBANDRY**.

RUNCHEs, in *Agriculture*, a term applied to charlock when dry and withered.

RUNCINATUM, FOLIUM, in *Botany*. See **LEAF**.

RUNCOL, in *Geography*, a town of Walachia; 15 miles N.W. of Tergofyl.

RUNCORN, a large township, royalty, and parish, in the western division of the hundred of Bucklow, county palatine of Chester, England, is situated on the S. bank of the river Mersey, at the distance of about 14 miles N.E. from the city of Chester. The royalty belongs to the earl of Cholmondeley, as annexed to the honour of Halton. Runcorn appears to have been anciently a town of considerable consequence. Ethelreda, the celebrated sister of king Edward the Elder, built a castle here, some traces of which can still be discovered on an eminence called the Castle Rock, situated about a quarter of a mile from the parish church. This fortress must have been important, as it commanded the passage from the kingdom of Mercia to that of Northumberland. In the year 1133, a priory for regular canons of the Augustine order was founded at Runcorn by William Fitz-Nigel, but they were shortly afterwards removed to Norton. The church, which belonged to this monastery, contains monuments in memory

of sir John Cheshyre, prime serjeant to queen Anne and king George I. who died in 1738, and also of three baronets of the Brooke family. Those of sir Richard Brooke, who deceased in 1781, and the late sir Richard, who died in 1795, were executed in marble by John Bacon, sculptor. Since the formation of the duke of Bridgewater's canal, which joins the Mersey close to Runcorn, this place has greatly increased in population and wealth, and has been improved by the erection of many handsome buildings. For some years past it has likewise been a fashionable resort for change of air and salt-water bathing.

The parish of Runcorn is extensive, and comprises nineteen townships. According to the population returns of 1811, the parish contained 1171 houses, and 6317 inhabitants, of whom 2060 resided in the township of Runcorn. Here are many fine quarries of free-stone, large quantities of which are sent by water-carriage to Chester, Liverpool, Manchester, and various other places. Lysons's *Magna Britannia*, vol. ii. Cheshire, 4to. Lond. 1810. *Beauties of England*, &c. vol. ii.

RUNDAL, a river of Norway, which runs into the sea, near Bergen.

RUNDENDORF, a town of Bavaria, in the bishopric of Bamberg; 7 miles N.N.W. of Bamberg.

RUNDLES, or **ROUNDLES**, in *Heraldry*, the same as balls or pellets.

RUNDLET, **RONLET**, or *Roundlet*, a small vessel, containing an uncertain quantity of any liquor, from three to twenty gallons.

RUNDULLA, in *Geography*, a town of Hindoostan, in Baglana; 10 miles E. of Naderbar.

RUNEHOLM. See **RUUN**.

RUNEKA, in *Hindoo Mythology*, is fabled as the mortal mother of Parafu Rama, an incarnation of Vishnu. Her husband was Jamadagni, one of the seven Rishis, or patriarchal sages. Under these several names or words explanations will be respectively found. On the death of Jamadagni, as related in that article, Runeka declared her intention of becoming Sati, that is *pure*, by the act of self-immolation on her husband's funeral pile. (See **SATI**.) The avaricious Raja, who had caused her husband's death, became thus charged with this double murder, and the vindictive Sati imprecated curses on him and his tribe, enjoining their valorous son Rama to avenge the death of his parents by the condign punishment of the impious Raja and the military tribe of Kshetria, (see **SECTS of Hindoos**.) whose measure of iniquity and oppression was completed by this final atrocity.

The prayers or imprecations of a Sati are never inefficiently uttered; the great gods themselves cannot listen to them unmoved. Vishnu accordingly inspired Rama with a portion of his divinity, and sent him forth to combat the Raja; who, after twenty battles, was slain, the military race of Kshetria annihilated, and his usurped kingdoms relieved from oppression.

On the occasion of this self-immolation of Runeka, it is related, that to strengthen the potency of her maledictions on the head of the murderous Raja, she, in addition to her own self-sacrifice, performed also the ceremony of Narmedha, or the sacrifice of a man, thereby rendering her solicitations to the avenging deities absolutely irresistible. And so lasting is said to be the effect of the wrath felt and transmitted by the vindictive Sati, and its attendant sacrifice and incantations, (see **MANTRA** and **NARMEDHA**.) that nothing can avert its severity, continued even to the present day, but a counteracting Narmedha; and that with the permission of Parafu Rama (who is considered as still living in the Kukan or Concan): a man is accordingly sacrificed to appease the

wrath of Runeka Devi, in every generation, by the tribe called Karhara, a military sect, many of whom are settled in the Kokan, Guzerat, and other western provinces of India.

Mr. Wilford, discussing some of these topics in the third volume of the *Asiatic Researches*, observes, that although human victims, Narmedha, allowed by ancient authorities, are now prohibited under pain of the severest torments in the next world, the prohibition is said to be disregarded by the Pamaras, or Pariar races, in different parts of India. But he cannot imagine that any Brahman would now officiate at so horrid a ceremony, denounced as it is in the *Brahma* and *Aditya Puranas*, and in the *Sri Bhagavat* itself.

Notwithstanding, however, the general incredibility of the fact, researches have since brought to light that a tribe of Brahmans, called, from officiating for that tribe, Karhara Brahmans, do still actually countenance and practise the horrible ceremony in question. They bear, at all events, the odium of it, and are consequently thunned by their holy brethren of more humane practices and tribes. They are themselves very reserved on the subject; and deny the present practice, but admit of its former existence. On this curious point many particulars, for which we have not room, are collected in Moor's *Treatise on Hindoo Infanticide*; to which, p. 195, we refer those desirous of farther information. Instances of recent sacrifices, and the names of the supposed victims, are there given.

The name of this maleficent lady is sometimes written *Renuci*, and *Renuka*. In the eleventh volume of the *Asiatic Researches* the following passage occurs, descriptive of her person and family. "In the white Island," which in passing we will observe Mr. Wilford endeavours to prove to be Albion, "lived Jamadagni, a great Muni (see **MUNI**), who can at his will destroy the world, who bestows rewards and inflicts punishments, knows the past and the future, and of whom the gods stand in awe. His wife was Renuka; in her manners and gait she is like Reti, the mother of Kama. (See those articles.) The whole world gazed at her with astonishment: her eyes are more beautiful than those of the antelope of the forest; her face is like the moon; she is a goddess, incapable of decay, immediately born of the supreme being. She is Iswari, the sovereign queen (see **ISWARA**); from her was born Rama, ever victorious," &c.

RUNGA, in *Geography*, a town of Hindoostan, in the circar of Cicacole; 25 miles S.W. of Cicacole.

RUNGIS, a town of France; 6 miles S. of Paris.

RUNGPOUR, a circar of Hindoostan, bounded on the N. by Coos Beyhar, on the E. by the Burhampooter, on the S. by Goragot, and on the W. by Dinagepour and Surroopour. The capital is Rungpour.

RUNGPOUR, a town of Bengal; 72 miles N.E. of Mauldah. N. lat. 24° 43'. E. long. 89° 23'.

RUNGS, in a *Ship*, the same with the floor or ground-timbers, being the timbers which constitute her floor, and are bolted to the keel, whose ends are called *rung-heads*; and more properly floor-heads.

RUNG-HEADS are made a little bending to direct the sweep or mold of the futtocks, and naval timbers; for here the lines, which make the compass and bearing of a ship, do begin.

RUNIC, a term applied to the language and letters of the ancient Goths, Danes, and other northern nations.

The word *rune*, according to Mallet, is derived from a word in the ancient Gothic language, signifying *to cut*: but Wormius, with greater probability, derives *rune* from either *ryn*, a furrow, or *ren*, a gutter or channel. As these characters were first cut in wood or stone, the resemblance

RUNIC.

to a furrow, or channel, would easily suggest the appellation. Others, however, derive the term from *ryne*, signifying art, especially that of magic.

Some have been of opinion that Gulphilas, or Ulphilas, a Gothic bishop, about the year 370, was the first inventor of the Runic character: but Olaus Wormius shews at large, that Ulphilas could only be the first who taught it to foreigners; for that the Runæ, or characters themselves, were older than he.

In reality, Ulphilas, according to other authors, was so far even from teaching the character, that he invented an alphabet of his own, on purpose to put the Runic characters, which had been made subservient to the superstitions of heathenism, out of use. See *GOthic Character*.

Many learned writers have adopted the opinion, first suggested by Dr. Hickes, that the Runic character was borrowed from the Roman, and they farther maintain, that it was not known in the North before the introduction of Christianity. If it were allowed, that the Runic characters are borrowed from the Roman alphabet, it by no means follows, that the Scandinavians had waited for the secret till the introduction of Christianity among them: but it is justly observed by Wormius, that they are as easily reducible to the Greek and Hebrew alphabets as to the Roman. An evident proof that the Runic were not derived from the Roman letters, results not only from their form, which has scarcely any resemblance to these, but from their number (being but 16), and their order and names, which have nothing in common with the Roman, Greek, or Gothic characters of Ulphilas. A comparative view of the Runic and Gothic in these respects may be seen in the English translation of Mallet's Northern Antiquities, vol. i. p. 370. M. Mallet has sufficiently shewn, that all the old chronicles and poems of the North universally agree in assigning to the Runic characters a very remote antiquity, and in attributing the invention of them to Odin or Woden himself, whom their poets expressly call the inventor of the Runes. Besides, instances occur of princes and pagan heroes, who made use of this character in an age long before Christianity had penetrated into the North.

In Blekingia, a province of Sweden, there is a road cut through a rock, on which are various Runic characters, said to have been engraved there by king Harold Hyldestand, in honour of his father; and king Harold is said to have ascended the throne about the beginning of the seventh century. It is, therefore, extremely probable that Odin introduced the Runic characters into the North, intending by the introduction of letters and writing to acquire respect from the rude uncivilized inhabitants of Scandinavia; who would be ready enough to conceive that there was something divine or magical in them. Accordingly we find, that they were actually employed, in spells and enchantments, for the pretended purpose of working prodigies.

A few years before the birth of Christ, as it has been said, soon after Mithridates had been overthrown by Pompey, a nation of Asiatic Goths, who possessed that region of Asia which is now called Georgia, and is connected on the south with Persia, alarmed at the progressive encroachments of the Roman armies, retired in vast multitudes under the conduct of their leader Odin, or Woden, into the northern parts of Europe, not subject to the Roman government, and settled in Denmark, Norway, Sweden, and other districts of the Scandinavian territory. As they brought with them many useful arts, particularly the knowledge of letters, which Odin is said to have invented, they were hospitably received by the natives, and by degrees acquired a safe and peaceable establishment in the new country, which seems to have adopted their language, laws, and re-

ligion. Odin is said to have been styled a god by the Scandinavians; an appellation which the superior address and specious abilities of this Asiatic chief easily extorted from a more savage and uncivilized people.

This migration is confirmed by the concurrent testimonies of various historians: but there is no better evidence of it, than that conspicuous similarity subsisting at this day between several customs of the Georgians, as described by Chardin, and those of certain cantons of Norway and Sweden, which have preserved their ancient manners in the purest degree. Not that other striking implicit and internal proofs, which often carry more conviction than direct historical assertions, are wanting to point out this migration. The ancient inhabitants of Denmark and Norway inscribed the exploits of their kings and heroes on rocks, in characters called Runic; and of this practice many marks are said still to remain in those countries. This art or custom of writing on rocks is Asiatic. Modern travellers report, that there are Runic inscriptions now existing in the deserts of Tartary. (See *Voyage par Strahleberg, &c. A Description of the northern and eastern parts of Europe and Asia*.) Schroder says, from Olaus Rudbeckius, that Runes, or letters, were invented by Magog the Scythian, and communicated to Tuifco, the celebrated German chieftain, in the year of the world 1799. (Præf. ad *Lexicon Latino-Scandic*.) The *written mountains* of the Jews are an instance that this fashion was oriental. On the subject of this migration, allowed by some writers and contested by others, see the articles *GOths* and *ODIN*.

The Runic characters were distinguished into various kinds. The *noxious*, or *bitter Runes* were employed to bring various evils on their enemies; the *favourable* averted misfortunes; the *victorious* produced conquest to those who used them; the *medicinal* were inscribed on the leaves of trees for healing; others served to dispel melancholy thoughts, to prevent shipwreck, as antidotes against poison, as preservatives against the resentment of their enemies, and in order to render a mistress favourable. These various kinds differed only in the ceremonies observed in writing them, in the materials on which they were written, in the place where they were exposed, in the manner in which the lines were drawn, whether in the form of a circle, a serpent, or a triangle, &c.

The Runic characters were also employed for more rational purposes: for writing epistles and epitaphs, and for various kinds of inscriptions, which, the older they are, so much the better are they engraven. They are rarely written from the right hand to the left; but it is not uncommon to meet with the line running from the top to the bottom, after the manner of the Chinese and other Indian nations; or from the top to the bottom, and then turning round to the left, and so up again to the place it begins at; or else from the left to the right, and so back to the left again, which was the manner of the early Greeks. The greater part of the ancient monuments written in the Runic character, which are still preserved, consists of inscriptions dispersed here and there in the fields, and cut out on large stones or pieces of rock. They are also found in churches, and sometimes in other buildings.

The Saxons, who were fond of tracing the descent of their princes from Odin, and who became possessors of England in the sixth century, imported into this country the old Runic language and letters. This appears from inscriptions on coins, stones, and other monuments, and from some of their MSS.

There are some Runic medals in the closets of the curious; and some modern Danish and English medals, the inscriptions of which are Latin, and the character Runic.

There

There is extant a coin of king Offa with a Runic inscription, which shews, that this character had been used by the Saxons as well as their Scandinavian brethren.

There are also Runic inscriptions in this island; one in Cumberland, and another in Scotland. See Hickee's *Thef. Ling. Sept.*

But the conversion of the Saxons to Christianity, which happened before the seventh century, entirely banished the common use of those characters, which were esteemed unhallowed and necromantic; and with their ancient superstitions, which yet prevailed for some time in the popular belief, abolished in some measure their native and original vein of poetical fabling. They suddenly became a mild and polished people, addicted to the arts of peace and the exercise of devotion; and the poems they have left us are chiefly moral rhapsodies, scriptural histories, and religious invocations, intermixed even with frequent allusions to the old Scaldic fables and heroes. See *SCALDS.*

We may here observe, that the enchantments of the Runic poetry are very different from those in our romances of chivalry. The former chiefly deal in spells and charms, such as would preserve from poison, blunt the weapons of an enemy, procure victory, allay a tempest, cure bodily diseases, or call the dead from their tombs; in uttering a form of words, or inscribing Runic characters; whereas the magicians of romance are chiefly employed in forming and conducting a train of deceptions. In the incantations of the former there is an air of barbaric horror: the latter often present visions of pleasure and delight; and although not without their alarming terrors, sometimes lead us through flowery forests, and raise up palaces glittering with gold and precious stones. The Runic magic is more like that of Canidia, in Horace; the romantic resembles that of Armida, in Tasso. The operations of the one are frequently but mere tricks, in comparison of that sublime solemnity of necromantic machinery, which the other so awfully displays.

In the tenth and eleventh centuries the Runic gave way to the Roman character; till at length the missionaries succeeded in totally abolishing them, as tending to retain the people in their ancient superstitions. It is said that the Goths, when they became Christians, manifested a blind and indiscreet zeal in destroying several ancient monuments, and burning a great number of books, because they were written with those characters; and that about the year 1001, the Runic characters were quite laid aside in Sweden, and the Roman letters taken in their room, the Swedes being persuaded to adopt this measure by the pope, and by Sigfrid, a British bishop. In Spain they were forbidden in 1136 by Alphonso, king of Castille and Navarre, and condemned by the council of Toledo in 1115. They are, however, still retained among the mountaineers of one province in Sweden. Mallet's *Northern Ant.* vol. i. p. 359, &c.

It is supposed they were called Runic, as being mysterious and scientific, like the Egyptian hieroglyphics. See Wormius de *Literatura Runica*; and Hickee's *Thefaurus of the ancient Northern Languages.*

In several parts of Sweden, stones may be met with, which were formerly set up as obelisks in memory of the dead; and these monuments are marked with the ancient northern letters called *Runor*, or the Runic characters. In some places the characters vary from the Runic, particularly in free-stones found in Helsingland, of which Mr. Celsius has given us a description, with an explanation. See *Philos. Transf.* N^o 445. sect. 3.

From these Helsingland inscriptions an alphabet of sixteen letters may be derived, which is very singular. In

other alphabets different sounds are generally denoted by different figures; but here the same character, according to the diversity of its place and altitude between two parallels, denotes different sounds.

But these characters, however different they may appear at the first sight from the Runic, may easily be derived from them; or, *vice versa*, the Runic may be derived from the Helsingic, if these be supposed the most ancient. The subtraction of a perpendicular line in the first case, or its addition in the latter, brings the two characters to a near resemblance.

The inscription, which Mr. Celsius considers, was published in *Monf. de la Motraye's Travels*, but erroneously.

Runic Staffs were a kind of calendars or compendious almanacs used in the North, marked out by lines upon short pieces of board or smooth sticks; some of which bear the appearance of great antiquity. They were called, in the North, *rim-stocks* and *prim-staffs*; and exhibited, by different lines or marks, the fasts and festivals, the golden number, Dominical letter, epact, &c. Dr. Plot, in his *History of Staffordshire*, p. 418, &c. describes one of these instruments under the name of a *clog*, and illustrates the construction of it by a figure. He observes, that this kind of almanac is a remain of the Danish government, and that it was still in use amongst the meaner sort of people. Those which he met with in Staffordshire had only the prime and immoveable fasts upon them; whereas others of a more perfect kind, preserved in the cabinets of the curious, have likewise the Dominical letters. And of those imperfect ones there are two kinds; some public, of a larger size, which were commonly hung at one end of the mantletree of the chimney, for the use of the whole family, as Wormius informs us they disposed of them in Denmark; and others private, of a smaller size, which they carried in their pockets. This chronological instrument is sometimes, by an evident corruption, called *runflock*.

RUNJETZ, in *Geography*, a town of Bohemia, in the circle of Chrudim; nine miles N. of Chrudim.

RUNIUS, JOHN, in *Biography*, one of the most celebrated of the Swedish poets, was born at West Gothland in 1679. Having received the early parts of his education at Skara, he went, in 1700, to Upsal, and after completing his studies, was appointed by count Stromberg to be his secretary. He died at Stockholm of a consumption in 1713, in the 35th year of his age. He is said to have written Swedish poetry at the age of 18, which displayed great beauty, and afterwards produced a variety of pieces on different subjects, which added very greatly to his poetical fame. He wrote with so much care, and his versification is so smooth and pleasing to the ear, that he is accounted by the Swedes one of the most successful of their poets. "Some of his poems are said to be very excellent, but many of them bear evident marks of carelessness and haste, for he experienced the common lot of genius, having been doomed, throughout life, to struggle with all the ills of poverty; and his distresses would have pressed upon him much heavier, had he not been frequently relieved by count Stromberg." His poems, which he began to collect in his life-time, when he found that they were in general requested, were published, after his decease, under the title of "Dudaim," Stockholm, 1714, in two parts; the first contains sacred poems, and the second epithalamia, epitaphs, and congratulatory odes. In 1733 both parts were reprinted, with the addition of a third, containing pieces on different subjects, among which were several poems written in Greek, French, and German. *Gen. Biog.*

RUNKEL, in *Geography*, a town of Germany, in the county of Wied-Runkel, situated on the Lahn, and consisting

sitting of about 120 houses. It has a citadel belonging to it, seated on a high hill, which was formerly the residence of the counts. The subsistence of the inhabitants is derived from agriculture, gardening, and the breeding of cattle. In the year 1634, this town was plundered and reduced to ashes by the Croats; 14 miles E. of Nassau. N. lat. 50° 23'. E. long. 8° 7'.

RUNN, a lake of Sweden, in the province of Dalecarlia; four miles S. of Fahlun.

RUNNAGAUT, a town of Bengal; 15 miles S. of Kishenagur.

RUNNEAH, a town of Hindoostan, in Candeish; four miles N.E. of Peplund.

RUNNEL, in *Rural Economy*, a term signifying a sort of rill.

RUNNEL is also used to signify pollard wood.

RUNNER, in the *Sea Language*, a rope belonging to the garnet, and to the two bolt-tackles. It is reeved in a single block, seized to the end of a pennant, and has at one end a noose to hitch into any thing, and at the other end a double block, into which is reeved the fall of the tackle, or the garnet; by which means it purchases more than the tackle or garnet could allow.

To *overhale the runner* is to pull down the hooked end, and hitch it into the sling.

RUNNET. See RENNET.

Aristotle will have the runnet to be the proper substance of the milk; but he is mistaken when he says it is found in all animals which give milk, especially in all ruminants.

RUNNING, in *Antiquity*, made one of the exercises performed in the *pentathlon*, (which see,) or *quinquertium*. See RACE and STADIUM.

This exercise was in so great esteem among the ancient Greeks, that such as prepared themselves for it, thought it worth their while to burn, or parch their spleen, because it was believed to be a hindrance to them.

Indeed, all those exercises that conduced to fit men for war, were more especially valued; and that swiftness was esteemed such in an eminent degree, appears from Homer's giving his hero the epithet of ποδας οκυς Αχιλλεύς.

RUNNING of the Eyes, in infants. See INFANT.

RUNNING-Fights, at sea. See FIGHTS.

RUNNING-Fire. See FIRE.

RUNNING out a Warp, in *Sea Language*, the act of carrying the end of a rope out from the ship in a boat, and fastening it to some distant place, to remove the ship towards the said place, or keep her steady while her anchors are lifted, &c.

RUNNING-Rigging denotes all that part of a ship's rigging which passes through the blocks, to dilate, contract, or traverse the sails. See RIGGING.

RUNNING the Gauntlet, in *Military Language*. See GANT-LOPE.

RUNNING of Goods, a clandestine landing of goods, without paying the legal customs or duties for the same. See SMUGGLING.

RUNNING-Saddle. See SADDLE.

RUNNING-Thrush, or *Fruß*, in *Farriery*, denotes an imposthume, that sometimes gathers in a horse's frog; or a scabby and ulcerous disposition which sometimes causes it to fall off. When this discharge is natural, the feet should be kept merely clean. When an imposthume appears, the safest course is to pare out the hard part of the frog, or that which appears rotten, and to wash the bottom of the foot three times a day with old chamber-ley. But if a horse has been neglected, and there be a strong flux to the part, it will be necessary, in order to prevent its degenerating into a canker,

to bathe the thrush with the following lotion, laying over the ulcer a little tow dipped in the same, and using the purges and diuretics recommended in the grease. Take spirit of wine and vinegar, of each two ounces; tincture of myrrh and aloes, one ounce; Ægyptiacum, half an ounce; and mix them together. See BARTLET.

RUNNING, in *Rural Economy*, a provincial term signifying rennet, or the coagulum made use of in cheese-making.

RUNNING Bull, in *Agriculture*, a term applied to the part of a harrow where the draught is attached in some cases. See HARROW.

RUNNO, in *Geography*, an island near the E. coast of Sweden, in the Baltic. N. lat. 57° 51'. E. long. 16° 33'.

RUNNODE, a town of Hindoostan, in the Malwa country; 30 miles N.W. of Chanderee. N. lat. 25° 7'. E. long. 78° 15'.

RUNNYMEAD, or RUNNEMEAD, a tract of land on the south bank of the river Thames, in the parish of Egham, and county of Surrey, England, is celebrated in history for the ever memorable conference which occurred here between king John and his barons, in the year 1215. In that conference the articles of Magna Charta, or the Great Charter, as it is called, by way of eminence, were agreed upon; and on the 15th of June the same was formally signed and sealed by the monarch, and a copy of it ordered to be deposited in the record office of each county. A small island in the Thames, adjoining the Mead, still retains the appellation of Magna Charta island, from a tradition that the charter was actually signed on that spot. There is at present a house upon it, and a ferry for foot passengers to Ankerwyke. It is said that Runnymede was used, in Saxon times, for holding councils. If so, observes Mr. Bray in "The History and Antiquities of the County of Surrey," its name may have been derived from the Saxon word "Rune, signifying council, the council mead." It contains about 160 acres of ground, tithe free, and is the property of ten persons, who have the sole use of it from March to the 12th of August, when it becomes common to all the parishioners of Egham, who turn out upon it an indefinite number of cattle; but in the last week of the same month it is appropriated as a race course, in conjunction with some adjoining inclosed lands, which are thrown open for the occasion. Near Runnymede are two meadows, called Long-mead and Yard-mead, to the southward of which the land rises to a ridge of hills, one of which, called Cooper's hill, has been immortalized by the strains of the poet Denham. The Roman road from London to Silchester passed through Runnymede. The History and Antiquities of the County of Surrey, by the Rev. Owen Manning, continued by W. Bray, esq. F.S.A., of Shire, vol. iii. Lond. 1814, fol.

RUNO. See RUUN.

RUNOR. See RUNIC.

RUNRIG, in *Agriculture*, an ancient inconvenient distribution of common field land, by which small portions or ridges of land were let to different individuals in a mixed manner.

The circumstances of land being distributed in alternate ridges as the property or possession of different tenants or holders, was unquestionably a consequence of early farming townships. It is a sort of arrangement which must have first taken place on account of some imperfect and confused notion or intention of doing justice in an equal manner to all the tenants or holders of land in such farming villages, by allotting to, or bestowing upon, every one of them the same number of ridges near their houses, and an equal number in remote situations. And in order to render the absurdity of such a mode of holding and occupying land still more preposterously complete, if possible, such ridges were,

in many cases, not unfrequently exchanged; so that one tenant possessed, in the succeeding year, the land which was held or occupied by his neighbour the preceding one.

It is remarked, that in many parts of the highlands of Scotland, the land under this distribution has been first ploughed, without leaving any boundaries, except the furrows between the ridges; then the field was divided, by putting small branches of trees into the ground, in order to mark off every tenant's portion before the field was sown. No man knew his own land until the seed was to be put into the ground; and it became almost impossible for him to have the same portion of land any two successive years. This is a mode of division, it is supposed, which is analogous to that which Cæsar has asserted to have prevailed among the ancient Gauls; which must absolutely debar the very least improvement.

This inconvenient and improper method of proceeding was greatly fostered by the feudal notions of the times; in which he that could muster the greatest number of retainers, generally constituted to himself the greatest estate. But in the present times nothing can be more absurd than to see two or three, or perhaps four men, yoking their horses together in one plough, and having their ridges alternately in the same field, with or without a bank of unploughed land between them, by way of boundary. These diminutive possessions, it is said, were carried to such a length, that in some parts of Scotland, towards the northern extremity, the term a *horse's foot*, the sixteenth part of a plough-gate of land, is not yet wholly laid aside. The land is stated to be like a piece of striped cloth, with banks full of weeds and ridges of corn in constant succession, from one end of a field to the other. Under such management, all such occupiers or possessors must have concurred in one opinion with regard to the time and manner of ploughing every field, the kind of grain to be sown, the season and weather fit for sowing, and whether they and their horses were to be employed or idle. So late as even thirty or forty years ago, this practice is stated to have prevailed, not only over the greater part of the county of Perth, but, with very few exceptions, over all other parts of Scotland. Since that period, however, it has been, it is said, gradually going into disuse; and that the benefit of laying it aside entirely is so apparent, that any remains of the runrig system, which may still be met with, must soon give way and disappear, except, it is supposed, where the landlord is as much a Goth as his tenants.

When the various avocations, which these tenants must have, and the frequent jarring animosities which must necessarily arise in a close neighbourhood, where opposite interests are constantly interfering, are fully considered, it is supposed impossible to expect, that under such a system any species of improvement can be undertaken or carried on. In short, townships and runrig are supposed such obstacles to improvement, and bolt the door so firmly against all good cultivation, that it cannot have the least entrance; they are consequently greatly destructive of all good management; and besides, hold the people in the chains of idleness and poverty wherever they may be found to prevail. It is only by the proper separation, division, and inclosure of land into distinct portions, whether small or large, for each individual tenant, occupier, or proprietor, that it can be cultivated and improved in the best manner, and to the greatest advantage.

RUNSH, in *Husbandry*, a term provincially applied to the troublesome weed wild mustard or charlock.

RUNSTYCKEN, or ORE, in *Commerce*, a money of account in Sweden, being the twelfth part of the skilling, and 48 skillings being = a riksdaler. Also a copper coin, of 1 ore koppar and half runstycken: the other copper

coins are single and double slants, at 1 and 2 ore silver, or 3 and 6 ore koppar: 96 double slants, 192 single slants, or 576 runstycken, are to pass for 1 specie riksdaler; but in large payments, no person is obliged to take more copper coin than the value of half a riksdaler. Un. Camb.

RUNT, the name used, with the distinction of places, for several species of pigeons. These are the Leghorn, the Spanish, the Friesland runt, &c. The *columba domestica Pijarum, Hispania, et Frisia*, of Moore.

The Leghorn runt is a stately large pigeon, seven inches or better in the legs, close-feathered, and fast fleshed, extremely broad-breasted, and very short in the back. He carries his tail, when he walks, somewhat turned up like a duck's; his neck is longer than any other pigeon's, and he carries it bending, like a goose or swan; he is goose-headed, and his eye lies hollow in his head, with a thin skin round it, like that of the Dutch tumbler; his beak is very short for so large a bird, and has a small wattle on it, and the upper chap falls a little over. It is a very valuable pigeon, but is tender, and requires care.

The Spanish runt is the longest bodied of all the pigeons; it is short-legged and loose-feathered, and does not walk so upright as the Leghorn runt. These are of a great variety of colours, but are apt to have accidents in sitting, from their sitting too heavy, and often breaking their eggs.

The Friesland runt is a large pigeon, and has all its feathers reverted, or looking as if placed the wrong way.

The Roman runt is a pigeon of the same general make with the common-kind, but so large and heavy, that it can hardly fly.

The Smyrna runt is middle-sized, and is feather-footed, and that to such a degree sometimes, as to look as if there were wings upon the feet; the feathers of these are sometimes four or five inches long, and often pull the eggs and young out of the nests.

The common runt is the common blue pigeon, kept for the table, and known to every body. Moore's Columb. p. 42. See PIGEON.

RUNT is also a name given to Canary-birds, when three years old. See CANARY-BIRD.

RUNT, in *Rural Economy*, a name given to a small kind of black cattle brought from Wales and Scotland.

But though this term be most usually applied to the small cattle of Wales and Scotland, it is not unfrequently employed in describing the properties and qualities of the smaller, and mixed English breeds, especially those which have a stiff compact, runt-like appearance, and which, in their feeding and their habits, have considerable resemblance to them. This sort of cattle stock is often very suitable for grazing farmers, in districts where the pastures are of the inferior kinds, and for feeding out on the artificial grass-pastures, where a large stock is wanted which will soon become fit for the butcher.

RUPALA, in *Botany*, Willd. Sp. Pl. v. 2. 536. Mart. Mill. Dict. v. 4. See RHOPALA and ROPALA.

RUPAS, in *Geography*, a town of Hindoostan, in Bahar; 18 miles S. of Hajypour.

RUPEE, ROUPIE, or *Roupies*, in *Commerce*, a money of account, and also a coin in various parts of the East Indies. During the prevalence of the Mogul power in Hindoostan, one principal coin, denominated the "sicca rupee," was every where current: it was of a determinate weight, called the "sicca," which served as a standard for other weights. The principal piece of gold was the "Mohur," which was of the same weight as the sicca rupee; and both were intentionally minted without any alloy. The same denominations of money are still current in India; but they differ from each other, and have deviated from their original purity.

The

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The East India Company have adhered to it as nearly as possible; but the monies of some of the native princes, which are of a high degree of fineness, are subject to frequent alterations; so that assayers and money-brokers, under the appellations of "shroffs, are appointed to set a value upon the different coins that are offered in payment.

The principal money of account in India is the "current rupee," to which real coins are reduced before they are entered into books of accounts. This reduction is performed by adding to the species a certain per-centage, called the "Batta," and varying according to the value of the coins, and also to the rate of exchange.

In Bengal, or Calcutta, accounts are kept in current rupees; each rupee being divided into 16 annas, and each anna into 12 pice. The East India Company, however, keep their accounts in sicca rupees, annas, and pice, which bear a batta of 16 *per cent.* against current rupees, annas, and pice; and in their public and financial statements, which are submitted to parliament, each sum of sicca rupees is reduced to current rupees, by adding to it this batta; and the current rupee is then reckoned at 2*s.* sterling. The Bengal coins, struck at the Calcutta mint, are sicca rupees, called also silver rupees, and gold mohurs, sometimes called gold rupees; 16 of the former being, by regulation, to pass for one of the latter. Thirty-two punns, or 2560 cowries, are generally reckoned for a current rupee; but the value of cowries fluctuates, nor are they considered as a legal tender above the value of 1 anna pice, without mutual consent of parties. A lack of rupees is a sum of 100,000, and a crore is 100 lacks, or 10,000,000 of rupees.

The sicca rupee is to weigh 1 sicca, corresponding to 179½ English grains, and to be 11 oz. 15 dwt. fine; thus it should contain 175.927 grains of fine silver, and its value is 24½*d.* sterling, or, more accurately, 24.566*d.* These rupees were formerly called sicca, only during the first year after their coinage, when the batta they bore on current rupees was 16 *per cent.*; the second year this was reduced to 13; and the third and following years, the batta was 11 *per cent.* They were then called "sonaut" or "funat" rupees. But by way of abolishing this distinction, all the rupees coined of late years by the East India Company have been dated the 19th sun, that is, the 19th year of the Mogul emperor's reign; and thus all the rupees of the above weight and fineness are considered of equal value, in whatever year they may have been coined.

According to these regulations, the current rupee is worth 21.177*d.*, valuing silver according to the mint price in England; but the market price in India is generally much higher, making this rupee worth 2*s.* nearly, and the sicca rupee about 2*s.* 6*d.* In the Company's books, 243 current rupees are valued at 100 dollars.

In the upper provinces of Bengal, there is another rupee, struck at the Ferruckabad mint, which weighs 173 grains, and contains 165.215 grains of pure silver; and therefore its sterling value is 23*d.* nearly.

The silver coins at Madras or Fort St. George are "Arcot" rupees. Each of these weighs 176.4 grains, and contains 166.477 grains of fine silver; and therefore its sterling value is 23¼*d.* It is divided into 12 annas and 192 pice, like the other rupees.

At Bombay accounts are kept in rupees; each rupee being divided into four quarters, and each quarter into 100 reas. The rupee is also divided into 16 annas. An urdee is two reas; a doreca, 6 reas; a dooganey, or single pice, 4 reas; a fuddea, or double pice, 8 reas. A paunchea is 5 rupees, and a gold mohur, 15 rupees. The annas and reas are only imaginary monies.

The coins of Bombay are the mohur, or gold rupee; the

silver rupee and its half; also the double and single pice, the urdee, and doreca, which are copper coins, with a mixture of tin or lead. The old Bombay rupee was the same as that formerly coined at Surat under the Mogul: it weighed 178.314 English grains, and contained 1.24 *per cent.* of alloy. It was agreed that both should circulate at an equal value, and the coin be kept to its exact standard of weight and fineness. At length, in 1800, the Company found it expedient to order the Surat rupee, which had been debased by an augmentation of alloy, to be struck at Bombay; and since that period, the rupees of both places have been kept at an equal value, weighing 179 English grains, and containing 164.74 grains of fine silver, which answer to 11 oz. 1 dwt. fine; and thus they are worth 23*d.* sterling.

In the Company's financial accounts, which are submitted to parliament, the Bombay rupee is reckoned at 2*s.* 3*d.*, and then it bears a batta of 16 *per cent.* against current rupees, though in the tables the batta is stated at 10 *per cent.* It was settled in 1800 that the mohur should be of the same weight and fineness as the silver rupee, and that it should pass for 15 such rupees.

At Anjengo, on the Malabar coast, a silver rupee is worth, 7 old fanams, or 6 new ones, called gallon fanams: the fanam is 12 pice, or 16 vis; and a pice 4 budgerooks: all these are real coins. In the Company's accounts, an Anjengo fanam is reckoned to be worth ⅓ths of a Calicut fanam, or ⅓th of a Surat rupee, which gives its intrinsic value about 4⅓*d.* sterling. At Calicut, 5 fanams are commonly reckoned for one rupee. The fanam is a small gold coin, with a considerable alloy of silver and copper, and the tar (⅓th of the fanam) is a small silver coin. The Calicut fanams have been found, by assays made at Bombay, to contain 52½ parts of gold, 29 of silver, and 17½ of copper. They are worth 6*d.* sterling. At Cambay, on the Malabar coast, accounts are kept in rupees of 48 pezas. The rupee is worth about 2*s.* sterling. A Venetian sequin passes here for 5 rupees; a Persian abassi for 1⅓ rupee; and a Persian mamoodi for 24 pezas. At Cochin, accounts are kept in rupees of 16 annas. These are reckoned of equal value to the Surat rupees. Accounts are also kept in fanams, 20 of which are generally reckoned for a rupee.

At Mangalore, accounts are generally kept in sultanny pagodas, rupees, and annas; the pagoda being 4 rupees, and the rupee 16 annas. At Masulipatam, accounts are kept in pagodas, rupees, and annas. The pagoda is 3½ silver rupees, and the rupee 16 annas. The coins are gold rupees, weighing 171¼ English grains, about 23¾ carats fine, and worth 1*l.* 10*s.* sterling; pagodas of nearly the value of the star pagoda of Madras; and silver rupees, 24¼ of which weigh a seer, or 4293 English grains, and the fineness of these rupees is 11 oz. 12½ dwt. The value is, therefore, 23½*d.* sterling.

The coins of the Myfore country are gold mohurs, passing for 4 pagodas; sultanny pagodas, and other pagodas, all passing for 13 fanams; and also sultanny fanams and cantery fanams, two small gold coins of base alloy. Also sultanny rupees, and rajah rupees, 26 of which pass for 7 sultanny pagodas; copper dudus, called by the English dubs: 260 dudus are the market price for a sultanny pagoda. The shroffs, in exchanging copper for gold or silver, pay at the rate of 234 dudus for a pagoda; but in changing gold and silver for copper, they receive 240; whilst the price fixed by government is 182 dudus *per* pagoda. The sultanny rupee weighs 177 grains, and is 11 oz. 5½ dwt. fine; and is therefore worth 23¼*d.* sterling nearly.

At Pondicherry, accounts are kept in pagodas of 24 fanams, and the fanam is subdivided into 60 cash. The coins are gold pagodas, and silver rupees and fanams, mentioned

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under Madras rupee; also copper cashes, and dudus, a copper coin, 20 of which are reckoned to a fanam. Gold and silver are weighed by the feer, pagoda, rupee, and fanam. A feer weighs $24\frac{3}{4}$ rupees, $81\frac{1}{4}$ pagodas, or $731\frac{1}{4}$ fanams. A rupee weight equals 30 fanams, or 480 nellos; a pagoda weight, 9 fanams, or 144 nellos. Thus 3 rupees are equal in weight to 10 pagodas.

At Scindy, the coins current are silver rupees of 16 annas, or 48 copper pice. At Surat, accounts are kept in rupees of 16 annas, or 64 pice. The coins are mohurs or gold rupees, and silver rupees, with halves and quarters.

A gold rupee passes for 15 silver rupees. Here are also pezas or pice, of copper or lead, 64 of which are reckoned to one silver rupee. See the coins under Bombay, *supra*.

At Tranquebar, accounts are kept in rixdollars of 12 fanams, and also in rupees of 8 fanams; and the fanam is divided into 80 cash. The coins are silver rupees, double and single fanams, and copper dudus or cash. Rupees are here coined under such regulations, that 1302 of them are worth 600 old Spanish dollars, weighing 43 lb. 7 oz. 2 dwt. troy. The value of the Tranquebar rupee is therefore $24\frac{3}{8}d$. sterling.

The following Table shews the Affay and Value of Rupees.

	Affay.		Weight.		Contents in pure Silver.	Value in Sterling.
	oz.	dwt.	dwt.	grs.		
Rupee of Mohammed Shah	B.	6 $\frac{1}{2}$	7	9 $\frac{3}{4}$	168.7	1 11 $\frac{1}{2}$
Rupee of Ahmed Shah	B.	12	7	9 $\frac{3}{4}$	172.8	2 0 $\frac{1}{4}$
Rupee of Allum Ghir (1759)	B.	13	7	11 $\frac{1}{2}$	176	2 0 $\frac{1}{2}$
Rupee of Shah Allum (1772)	B.	14	7	10	175.1	2 0 $\frac{1}{4}$
Rupee of the same (Benares 1774)	B.	8	7	6 $\frac{3}{4}$	167.5	1 11 $\frac{1}{4}$
Rupee of the same (1779)	B.	14 $\frac{1}{2}$	7	11 $\frac{1}{2}$	177.4	2 0 $\frac{3}{4}$
Rupee, Sicca, coined by the East India Company at Calcutta, and dated the 19th year of the emperor's reign	B.	13	7	11 $\frac{1}{2}$	175.8	2 0 $\frac{1}{2}$
Rupee, Arcot (1759)	B.	7	7	9 $\frac{3}{4}$	170	1 11 $\frac{3}{4}$
Rupee, Arcot (1782)	B.	8	7	6	166.8	1 11 $\frac{1}{4}$
Rupee, Arcot (1788)	B.	8	7	9 $\frac{1}{4}$	169.8	1 11 $\frac{3}{8}$
Rupee, Arcot, of the latest coinages	B.	4 $\frac{1}{2}$	7	8 $\frac{1}{2}$	166.5	1 11 $\frac{1}{4}$
Rupee, Bombay, old	B.	13	7	10 $\frac{1}{4}$	174.6	2 0 $\frac{1}{2}$
Rupee, Bombay, new, or Surat	W.	1	7	11	164.8	1 11
Rupee, Lucknow	B.	8 $\frac{3}{8}$	7	5 $\frac{3}{4}$	166.5	1 11 $\frac{1}{8}$
Rupee, Sultanny	B.	3 $\frac{1}{2}$	7	9	166.2	1 11 $\frac{1}{4}$
Rupee, Madepoor or Nowsee	W.	5	7	5 $\frac{3}{4}$	158.2	1 10
Rupee, Madras Rajapoor	B.	4	7	7	164.8	1 11
Rupee, Jeypoor	B.	12	7	7	170.6	1 11 $\frac{3}{4}$
Rupee, Furruckabad Sicca	B.	7 $\frac{1}{2}$	7	5	165.2	1 11
Fanam, Cannanore	W.	1 $\frac{1}{4}$	1	11 $\frac{3}{4}$	32.9	0 4 $\frac{1}{2}$
Fanam, Bombay, old	B.	13	1	11 $\frac{3}{8}$	35	0 4 $\frac{3}{8}$
Fanam, Pondicherry	B.	5 $\frac{1}{2}$	1	0 $\frac{1}{2}$	22.8	0 3 $\frac{1}{4}$
Fanam, Pondicherry, double	W.	3	1	18 $\frac{3}{4}$	39	0 5 $\frac{1}{4}$
Rupee, Chanderry	W.	0 $\frac{3}{4}$	7	5	159.5	1 10 $\frac{1}{4}$
Rupee, Oukery	W.	1	7	7	146.9	1 8 $\frac{1}{2}$
Rupee, Shree Sicca of Poona	W.	1 $\frac{1}{2}$	7	4 $\frac{1}{2}$	158.5	1 10
Rupee, Halee Sicca	B.	12 $\frac{1}{2}$	7	7 $\frac{1}{4}$	171.2	2 0
Rupee, Ougein	B.	5	7	6 $\frac{1}{4}$	166.8	1 11 $\frac{1}{4}$
Rupee, Maifere or new Holkar	B.	7	7	5	165.1	1 11
Rupee, Indore Holkar	B.	4 $\frac{1}{4}$	7	5	164	1 10 $\frac{3}{4}$
Rupee, Chinsource	B.	2	7	4 $\frac{3}{4}$	159.7	1 10 $\frac{1}{4}$
Rupee, Broach, old	W.	0 $\frac{1}{2}$	7	10	170.8	1 11 $\frac{3}{4}$
Rupee, Broach, new	W.	10	7	10	157.3	1 10
Rupee, Brodera, old	W.	4 $\frac{1}{2}$	7	10 $\frac{1}{2}$	162.7	1 10 $\frac{3}{4}$
Rupee, Brodera, new	W.	10 $\frac{1}{4}$	7	10 $\frac{1}{2}$	157.3	1 10
Rupee, Ana Sai, coined at Cairra	W.	10 $\frac{3}{4}$	7	8 $\frac{1}{4}$	155.1	1 9 $\frac{3}{4}$
Rupee, Ana Sai, coined at Pitlad	W.	17 $\frac{1}{2}$	7	9 $\frac{3}{4}$	151	1 9
Rupee, Amedabad Sicca	W.	7 $\frac{1}{2}$	7	10	160	1 10 $\frac{1}{4}$
Rupee, Mungull Sai	W.	10 $\frac{1}{4}$	7	10 $\frac{1}{2}$	157.2	1 10
Rupee, Mumo Sai	W.	8 $\frac{3}{4}$	7	9 $\frac{3}{4}$	157.6	1 10
Rupee, Seea Sai (coined in Futty Sing's time)	W.	9 $\frac{1}{2}$	7	7 $\frac{3}{4}$	155.6	1 9 $\frac{3}{4}$
Rupee, Cambay	W.	18 $\frac{1}{2}$	7	10	151	1 9
Rupee, Perfian (1745)	B.	13	7	9 $\frac{1}{4}$	175.4	2 0 $\frac{1}{4}$
Rupee, Perfian (1789)	B.	12 $\frac{1}{2}$	7	10	175.3	2 0 $\frac{1}{2}$
Larin	B.	10 $\frac{1}{2}$	3	2 $\frac{1}{2}$	72.1	0 10
Buffora Crux	W.	0 $\frac{1}{4}$	11	16	118.1	1 4 $\frac{1}{2}$

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The inscriptions on the silver coins of the East Indies are as follow :

The sicca rupee has the legends nearly the same as on the mohur, and may be thus translated: "Struck in the seven climates (date of the Hegira), by the shadow of God's favour, Shah Allum king, disciple in the faith of Mahomet;" and on the other side, "Struck at (name of the place), in the 19th year of the august and glorious reign of the emperor," &c. Some rupees do not bear the date of the Hegira, but only that of the emperor's reign; and all the rupees struck in Bengal of late years, at the Company's mint, have been dated the 19th year of his reign, as above.

The Arcot rupee has on one side, "Blessed coin of the conquering king" (the name); on the other side, "Struck at Arcot in the year — of the reign," and the date of the Hegira. But it may be observed, that in these and many other rupees, except such as are coined by the East India Company, the legends are often illegible, owing to the edge being clipped or worn, or to the piece being too small to receive the impression.

The rupee of the Dutch East India Company has on one side, "Coin of the company of Holland," and the date of the Christian era; on the other side, "In the great island of Java."

The sultany rupee of Tippoo bears the same impressions and legends nearly as Tippoo's mohur.

The rupee of Persia, or piece of 10 mamoodies, has various legends. Some bear the sovereign's name, as "Sultan Shahrokh;" and on the other side, "May God prolong his reign, coined at" (the name of the place and date of the Hegira). On other rupees, the king of Persia styles himself "The servant of the monarch," that is, of the Iman Riza, the head of their religion, whom the Persians consider as the real sovereign of their empire; and the coins are often struck in the name of the Iman Riza, with this legend, "By the divine decree, the coin of happy omen has been struck in the name of Ally Riza, son of Mufa;" and on the other side, "There is no God but God, Mahomet is the apostle of God, Ally is the favourite of God, struck at —," with the date of the Hegira.

The silver fanam of Pondicherry bears on one side several flower de luces; and on the other, various flowers, dots, and lines, without any inscription.

The larin is a silver wire about half an inch in length, doubled up, and flattened on one side to receive the impressions of some characters. It was first made in Arabia, and has become scarce, but is still used as money of account.

The mohur, or gold rupee, (coined under the reign of the emperor Shah Allum, which began in 1770,) has on one side, "He who is the shadow of God's favour, the protector of the religion of Mahomet, the emperor Shah Allum, coins money for the seven climates," with the date of the Hegira; on the other side, "Struck at — the year — from the happy accession." Some mohurs have only, on one side, "Coin of the emperor Shah Allum," with the date of the Hegira; and on the other, the year of the reign. The coins struck by the East India Company bear the name of the Mogul emperor; and those minted of late years are dated the 19th year of the emperor's reign, and the number 19 is visible on some part of the piece.

The mohur of Tippoo has on one side, "The faith of Mahomet, the most excellent in this world, is supported by the splendour of the victories of Hyder. Hyder! exalted in equity; struck at Seringapatam, the year pre-eminent in prosperity," with the date of the Hegira. On the other

side, "He alone is the equitable sultan; the epoch of the accession was a year of happy omen," with the date of the reign. Some of Tippoo's coins are dated according to an Indian era, which is divided into cycles of 60 years each; of which cycles 81 are supposed to be now elapsed.

The faruki, or quarter mohur of Tippoo, has on one side, "Mahomet, he is the only and right sultan," with the date; and on the other side, "Faruki, struck at Patan" (Seringapatam), with the date of Tippoo's reign, and a Persian H, the initial of Hyder.

The zodiacal rupees are pieces of twelve different impressions, representing the twelve signs of the zodiac. They were coined between the years 1616 and 1624 of the Christian era, by Jehangeer, and have been long out of circulation. They are, however, much sought after, and highly valued as objects of curiosity. Each sign, or figure, is surrounded by rays representing the sun; and on the reverse is the following inscription: "This ornamented coin in Agra found its face (received its impression) in the year — from the sovereign Jehangeer, son of king Akber."

The zodiacal rupees are exceptions to the Mahometan law, which forbids the representation or embossment of figures; but it is said that Jehangeer had little respect for his religion; and it is further stated by some writers, that his favourite queen, Nur Mahal, had obtained permission to reign for one day, (others say for one year,) and that she caused these coins to be struck, to perpetuate the memory of her short reign. This account, however, cannot be quite correct, as the dates of these rupees are different.

We shall here add, that in the business of exchange, London draws on Bengal in current rupees at 2s. more or less, or in sicca rupees at 16 *per cent.* above current; also on Madras in pagodas at 7s. 6d. more or less; and on Bombay in rupees at 2s. 2d. more or less.

Such bills are mostly at 60 or 90 days sight: but bills from those places on London are generally drawn at 6, 9, or 12 months sight; in which case, the sicca rupee is valued at 2s. 6d., the pagoda at 8s., and the Bombay rupee at 2s. 4d. sterling, more or less.

The bank of Bengal has been incorporated by a charter for seven years, granted under the governor-general in council, by virtue of the authority vested in him by the act of the 47th of George III. sec. 2. cap. 28.

The capital of the bank is 5,000,000 sicca rupees, that is, 50 lacks. It is divided into 500 equal shares, 100 of which belong to the government, and the other 400 to individuals.

The business of the bank chiefly consists in issuing notes, keeping cash for others, discounting bills, and granting loans at short periods, for the accommodation of merchants, and the general convenience of the public.

The notes of this bank are issued at sums not less than 10 sicca rupees, and not exceeding 10,000: they are paid off in specie when presented, and are therefore accepted as cash in all transactions, although they have not been declared a legal tender, except in payments to be made to government at their general treasury, and other offices of the presidency; and likewise at the provincial treasuries, but under certain conditions and limitations.

The interest of money in India fluctuates from 8 to 12 *per cent. per annum*, and it has been even higher; but the bank, which engages not to charge above 12, has already lowered the rate of interest, and has in many other respects rendered essential service to trade and commerce. We are indebted for the materials of this article to the excellent work of Dr. Kelly, entitled the "Universal Cambist."

RUPEE, Gold. See MOHUR.

RUPELA, in *Geography*, a town of European Turkey, in the Morea; 12 miles S.W. of Corinth.

RUPELLENSIS SAL, *Rochelle Salt*, in *Chemistry*, a name given to a peculiar salt, invented by M. Seignette, apothecary, at Rochelle, and extolled as a very valuable medicine.

The preparation of it was kept a great secret, till Messrs. Boulduc and Geoffroy discovered and published its composition.

To prepare this salt, crystals of marine alkali are to be dissolved in hot water, and into this liquor powdered cream of tartar is to be thrown. When the effervescence ceases, more cream of tartar is to be added, till the liquor is saturated; it is then to be filtered and evaporated; and very fine and large crystals may be obtained by cold, each of which is the half of a polygonous prism cut in the direction of its axis.

The crystallization of this salt, according to M. Baumé, as well as of the vegetable salt, is much more easy and more beautiful, when the liquor, in which it is made, contains an excess of alkali, which does not prevent the salt from being exactly neutral, after it has been well drained.

The salt of Seignette has a saline taste, moderately strong, and disagreeable. It retains much water in its crystallization, is soluble in a less quantity of hot water than of cold water, and becomes farinaceous in a dry air.

This salt is used only in medicine; being a good purgative, when taken from an ounce to an ounce and a half. It is dissolved in pure water, or in pitans and mineral waters, to render them purgative. It is also given in small doses of one or two drachms, as an alterative, aperitive, and corrector of other purgatives. But, upon the whole, it does not differ much from ordinary soluble tartar. This is now known under the name of "tartrate of potash and soda," &c. &c. See SODA.

RUPELMONDE, in *Geography*, a town of France, in the department of the Two Nethes, at the union of the Ruppel and the Scheldt; 8 miles S.S.W. of Antwerp.

RUPENDA, a country of Africa, W. of Mocaranga.

RUPERSBACH, a town of Bavaria, in the principality of Aichtadt; 3 miles N.W. of Aichtadt.

RUPERSDORF, a town of Bohemia, in the circle of Koniggratz; 4 miles N.N.W. of Branau.

RUPERT, *Prince*, in *Biography*, third son of Frederic, elector palatine of the Rhine, and Elizabeth, daughter of James I., and he was, consequently, nephew to king Charles I., was born in the year 1619. His education, like that of most German princes, especially the younger brothers, qualified him for arms, and he was soon discovered to be extremely well fitted in respect to natural abilities, and acquired accomplishments for a great commander. In his thirteenth year he accompanied the prince of Orange to the siege of Rhinberg, and so greatly distinguished himself, that at the age of eighteen he was entrusted with the command of a regiment of cavalry. He was taken prisoner in the following year by the Imperialists, who detained him a considerable time. Having obtained his liberty, upon the ruin of the house-palatine in Germany, he came to England with his brother Maurice in 1642, and offered his services to their relation Charles I., between whom and the parliament, war had just commenced. Through the whole war he behaved with great intrepidity; and on many occasions his exertions were attended with very extraordinary success. Almost at the outset of the business he was placed at the head of a body of horse, with which he immediately routed a part of lord Essex's cavalry, and established his character for spirit and enterprise. At the

subsequent fight at Edge-Hill he commanded the right wing of the royalists, with which he drove out of the field the parliament horse; but, by an incautious pursuit, the king's infantry were left exposed, and suffered severely, so that the result was a drawn battle. In the next he proceeded into the west to join the Cornish royalists: and afterwards he undertook the siege of Bristol, which city he carried by assault. He was present at the battle of Newbery, where he broke the enemy's horse; but was repulsed in his charge on their foot. The king, on account of his great services, advanced him to the dignity of a peer of England, by the title of earl of Holderness, and duke of Cumberland. In 1644 he relieved Newark, besieged by the parliamentarians; after which, having collected a considerable force, he marched against the earl of Manchester, then investing York, and made a junction with the marquis of Newcastle. Contrary to the advice of that nobleman, he engaged the parliament army in a pitched battle at Marston-Moor, and placed himself in the right wing. He was there opposed by Cromwell, and in the conflict prince Rupert's cavalry was put to flight. The final issue was a defeat of the royalists, which was, in fact, the commencement of the misfortunes that thenceforth attended the king's arms. In this action the courage of prince Rupert was signally displayed; but his precipitation, and want of attention to the marquis of Newcastle, were very much censured; he, however, redeemed his character by some spirited services which he performed between this and the battle of Naseby, in which he took a most distinguished part. He commanded in the right wing; and by the impetuosity of his charge he defeated the parliament's left, under the command of Ireton; but committing his usual fault of pursuing inconsiderately, the battle was lost before he could return to restore order. After this event, he withdrew towards the west, and threw himself into the city of Bristol. That important place, thus garrisoned, was expected to make a vigorous defence; but the prince seems to have lost himself on this occasion, and surrendered the city to Fairfax before a close attack was made. The king was so indignant at his conduct, that he recalled all his commissions, informing him he could thenceforward dispense with his services.

When a part of the English navy, in 1648, went over to Charles II., it was placed under the command of prince Rupert, who attempted, in vain, the relief of some maritime towns and fortresses, attacked by the republicans. He then carried on a predatory war, by which the English trade in the western seas was so much annoyed, that admiral Blake was sent with a squadron in pursuit of him. He took shelter in Kinfales, whence he escaped to Portugal, and was protected from his pursuer. He, however, lost a great part of his fleet on the coast of Spain, and with the remainder sailed to the West India islands, where, for some time, he supported himself by making prizes of Spanish and English ships. His brother, prince Maurice, who commanded a separate squadron, being shipwrecked among the islands, Rupert sailed to France, where he disposed of his prizes and ships, and joined Charles at the French court. Between this period and the restoration he occupied himself with those studies which afterwards rendered him celebrated in the annals of science, and to which we shall have occasion to refer at the conclusion of this article.

On the king's restoration, prince Rupert was invited into England, where the king, who had a sincere affection for him, gave him various offices worthy of his high birth. In 1666 the king entrusted him, in conjunction with the earl of Albemarle, to command the fleet, and he soon manifested

RUPERT.

all the great qualities that could be desired in an admiral; for, by his happy return to the fleet, he wrested from the Dutch the only victory they had the appearance of gaining, and, afterwards, on the 24th of June, beat them effectually, pursued them to their own coast, blocked up their harbours, and made them fully sensible of the superiority of English courage when not oppressed by numbers. In the autumn of the same year, having the sole command of the fleet, and learning that the Dutch were endeavouring to join a French squadron of forty sail under the duke of Beaufort, he followed them so closely into the Boulogne road, that, to avoid a battle, they hauled to near the shore, as in all probability they must either have been sunk or burnt, if a sudden storm had not forced the prince to return to St. Helen's bay.

On the prince's return home he was kindly received by the king, and grew into high esteem with the nation. The Dutch war was again renewed in 1673, the French being at this time in alliance with the English. Prince Rupert was appointed admiral of the English fleet, having under him sir Edward Spragge, and the earl of Ossory. Two indecisive actions ensued in May and June, and prince Rupert, whose bravery could not be doubted, was suspected, probably without reason, of being disinclined to the favourite political schemes of assisting the French to ruin the Dutch, and of augmenting the royal authority at home. On his part he complained that he was ill supplied with necessary articles by the admiralty, which was under the controul of the duke of York. To prove the fact, he, without particular orders, returned home, immediately after the battle of the 5th of June, and had address enough to persuade the king to come and examine the state of the fleet with his own eyes. This put the matter beyond all cavil and dispute, and obtained the necessary supplies without any delay, and as he had shewn his spirit by appealing to the senses of his majesty, so he gave as signal a proof of his activity and enterprise, by carrying the whole fleet through the Narrow seas on the 19th of July, and appearing on the Dutch coast, almost as soon as they had received certain intelligence of his returning to his own. In the following August, however, an engagement took place off the Texel, in which the two maritime rivals displayed all the obdurate valour that had rendered their former contests so memorable in naval history, and of which a full and most interesting account will be found in Campbell's Lives of the Admirals, vol. ii. ed. 1813. Prince Rupert was personally opposed to De Ruyter, and by the greatest exertions he disengaged his squadron from numerous assailants, and came to the relief of that of sir Edward Spragge, which had lost its brave commander. (See SPRAGGE.) The French kept aloof, and both sides claimed the victory. This was the close of prince Rupert's warlike services.

On his return from the command, the king expressed some coolness, which was owing, not more to the arts of his highness's enemies, than to the quickness of his letter, in which he gave an account of this last fight, the contents of which a contemporary historian gives in the following words. "In the midst of so many intrigues of opposition here at home, so many delays of his commission, so few powers contained in it, such scanty number of seamen, so little assurance of divers chief commanders, such failure of provisions; such want of ammunition, and all other necessities, such deceit of navy officers, such non-observance of orders at sea, amongst his own English, and so many manifest defections of the French, not to be staggered in his resolution, nor to be put out of all patience and prudence in action, nor to abate of his affection and zeal for the

honour and service of his majesty, the safe-guard and interest of religion and the kingdom; in a season when so many Popish projectors played a game under board, and above too; will be an everlasting argument of his highness's valour and renown, and must needs be a strong obligation upon the king, the parliament, and the people of England, who are now left to judge, whether it was not a wonderful good providence of God, or one of the most memorable pieces of service ever done at sea, to surmount all those difficulties, and even envy itself; and, after all, to bring home the fleet royal of England, without the loss of one man of war, to her own shore in safety, in despite of all enemies that designed otherwise by sea and land."

But the king's displeasure was not lasting, and he was soon replaced in his favour. After this, prince Rupert led a quiet and, in a great measure, a retired life, mostly at Windsor castle, of which he was governor, and spent a great part of his time in the prosecution of chemical and philosophical experiments, as well as the practice of mechanic arts, for which he was very famous. He is mentioned by foreign authors with applause for his skill in painting, and celebrated by one of the most judicious of our own, for his invention of mezzotinto prints, since risen, from their softness and beauty, into so high esteem. He likewise delighted in making locks for fire-arms, and was the inventor of a composition called, from him, Prince's metal. He communicated to the Royal Society his improvements upon gunpowder, by refining the several ingredients, and making it more carefully; which, as appears upon several trials reported to that learned body, augmented its force, in comparison of ordinary powder, in the proportion of ten to one, an invention which, though too expensive for common occasions, deserves to be remembered, because, in particular cases, it may be of singular utility. He also acquainted them with an engine he had contrived for raising water, and sent them an instrument, of which he made use, to cast any platform into perspective, and for which they deputed a select committee of their members to return him their thanks. He was the inventor of a gun for discharging several bullets with the utmost speed, facility, and safety, which was generally and justly admired. The Royal Society received likewise from his highness the intimation of a certain method of blowing up rocks in mines, and other subterraneous places. The very ingenious and indefatigable Dr. Hooke has preserved another invention of his for making hail-shot of all sizes. He devised a particular kind of screw, by the means of which, observations taken by a quadrant at sea were secured from receiving any alteration by the unsteadiness of the observer's hand, or through the motion of the ship. It was said that he had also, among other secrets, one that was very curious, and, if preserved, might be very beneficial, which was that of melting or running black lead, like a metal, into a mould, and reducing it back again into its original form.

As to his public character in the last ten years of his life, it was that of a patriot, which was owing to the innate honesty of his temper, and not to his having any liking to intrigues. He gave indefatigable attention to whatever appeared to him conducive to the public good. He was a great promoter of the trade to Africa, and a principal protector of the Royal African Company; as a proof of which, before the first Dutch war in this reign, he offered his majesty to sail with a squadron to the coast of Guinea, in order to vindicate the honour of the crown, assert the just rights of the company, and redress the injuries done to the nation; but the king, unwilling to hazard his person at such a distance, and in so sickly a climate, though he received the motion kindly, would not consent to it, but contented himself

self with taking an officer of his recommendation (captain Holmes), under whom the squadron was sent. He was an active member of the council of trade. It was owing to his solicitations, after being at great expence, not only in the inquiry into the value, but in sending ships thither, that the Hudson's Bay Company was erected, of which he was the first governor appointed by the charter. In memory of him, a considerable opening on the east side of that bay, in Terra de Labrador, is called Rupert's river. In general, his highness was a great friend to seamen, and to all learned, ingenious, and public-spirited persons, and assisted them with his purse, as well as afforded them his countenance. He was concerned in the patent for annealed cannon, in a glass-house, and other undertakings for acquiring or improving manufactures, for which some have censured him, as giving encouragement to projectors. But surely this censure is very ill placed, since, without such patrons, industry and ingenuity would want support, and many useful inventions, many valuable discoveries, barely emerge, and then sink again into oblivion. But strict justice has been done to his highness's many virtues, and amiable qualities, by abler and more impartial judges, especially in that excellent character of him by the elegant pen of bishop Sprat. In respect to his private life, he was so just, so beneficent, so courteous, that his memory remained dear to all who knew him. This, observes Campbell, I say of my own knowledge; having often heard old people in Berkshire speak in raptures of prince Rupert.

He died at his house in Spring-Gardens, on the 29th of November 1682, in his grand climacteric, leaving behind him a natural son, usually called Dudley Rupert, by a daughter of Henry Bard viscount Bellemont, though styled in his father's last will and testament Dudley Bard. He received the first tincture of letters at Eton school, where the gentleness of his temper, and the modesty and amiableness of his behaviour, procured him universal esteem. His genius, however, inclining rather to arms than study, he was placed under the care of that celebrated mathematician sir Jonas Moore at the Tower. Here he continued till the demise of that prince, when he made a tour into Germany to take possession of a considerable fortune which had been bequeathed to him. He was very kindly received by the Palatine family, to whom he had the honour of being so nearly allied. In 1686 he made a campaign in Hungary, and distinguished himself at the siege of Buda, where he had the misfortune to lose his life, in the month of July or August, in a desperate attempt made by some English gentlemen upon the fortifications of that city, in the 20th year of his age, and, though so young, he had signalized his courage in such an extraordinary manner, that his death was exceedingly regretted. Hume. Campbell's Lives of the Admirals.

RUPERT, in *Geography*, the north-westernmost township of Bennington county, in the state of Vermont, America, containing 1630 inhabitants; 20 miles N. of Bennington.

RUPERT'S Bay, a bay on the N.W. coast of the island of Dominica, which is deep, capacious, and sandy, and affords good shelter from the winds. It is the principal bay of the island, and on it is erected the town of Portsmouth. N. lat. $15^{\circ} 40'$. W. long. $61^{\circ} 18'$.

RUPERT'S Fort, lies at the bottom of Hudson's bay, in North America, situated on a river of the same name, on the E. side of James's bay, between Slade river N., and Nordway river S. N. lat. $51^{\circ} 50'$. W. long. $80^{\circ} 5'$.—Also, a fort on the W. coast of the island of Barbadoes; 1 mile N. of Speight's town.

RUPERT'S Head, a cape on the W. coast of the island of Dominica. N. lat. $15^{\circ} 41'$. W. long. $61^{\circ} 19'$.

RUPERT'S Island, the most westerly of four islands in the straits of Magellan, forming the S. side of Royal Reach; 3 miles S. of Passage Point.

RUPERT'S River, a river of North America, which runs from lake Mistafin into James's bay, Hudson's bay. N. lat. $51^{\circ} 28'$. W. long. $78^{\circ} 56'$.

RUPERT'S Drops, *lacrymæ Batavicae*, a sort of glass drops with long and slender tails, which burst to pieces on the breaking off those tails in any part, said to have been invented by prince Rupert, and therefore called after his name.

The history of these drops is this: they were first brought into England by prince Rupert out of Germany, and shewn to king Charles II. who communicated them to the Royal Society at Gresham College; and a committee, appointed on this occasion by the society, gave the following account of them. They must be made of green glass well refined, for till the metal, as the glass-men call it, is perfectly refined, they never succeed if made of it; but always crack and break soon after they are dropped into the water.

The best way of making them is to take up some of the metal out of the pot upon the end of an iron rod, and immediately let it drop into cold water, and there lie till it is cold. If the metal be too hot when it is dropped into the water, the business does not succeed, but the drop frosts and cracks all over, and falls to pieces in the water, and every one that does not crack in the water, but lies in it whole till it is quite cool, is sure to be good. There is great nicety in the hitting a due degree of heat in the metal, and the workmen who best know their business cannot promise before hand which shall succeed, but often two fail for one that hits right. Some of them frost over the surface without falling to pieces, and others break into pieces before the red heat is quite over, and that with a small noise; others break soon after the red heat is over and make a great noise, and some neither break nor crack till they seem to be quite cold; and others hold together while they are in the water, but fly to pieces with a smart noise when they are taken out of it; some do this on the instant, others an hour or two after, and others will keep several days, nay weeks, and at last fall to pieces without being touched.

These drops, thus formed, are so hard, that they will bear smart blows of a hammer, on the rounded end, without breaking; and yet if you grind the surface, or break off the tip of the tail, they will shatter, with a loud report, into powder; and in an exhausted receiver, with greater impetuosity than in the open air, and into a finer powder, exhibiting light, when the experiment is made in the dark. But if the drops are ground with powder of emery and oil, or annealed by the fire, they will escape breaking.

This surprising phenomenon is supposed to arise from hence; that while the glass is in fusion, or in a melted state, the particles of it are in a state of repulsion; but being dropped into cold water, it so condenses the particles in the external parts of their superficies, that they are thereby reduced within the power of each other's attraction, and by that means they form a sort of hard case, which keeps confined the before-mentioned particles in their repulsive state; but when this outer case is broke by the breaking off the tail of the drop, the said confined particles have then liberty to exert their force, which they do by bursting the body of the drop, and reducing it to a very peculiar form of powder. See a paper on the phenomena and explication of these glass-drops, by Dr. Le Cat, in the *Philos. Transf.* vol. xlvi. p. 175, &c. See *Annealing of GLASS*.

RUPERTSDORF, HOHEN, in *Geography*, a town of Austria; five miles S.W. of Zisterdorf.

RUPICAPRA, in *Zoology*, a species of antelope. See CHAMOIS. See also OVIS *Annon*.

RUPICHSERADT, in *Geography*, a town of the duchy of Berg; four miles N.E. of Blankenberg.

RUPINIA, in *Botany*, from *rupes*, a rock, alluding to its place of growth, is a name given in the Supplement of Linnæus to what Forster had called *Aitonia*, after the celebrated curator of Kew garden; there being another *Aitonia* in that same work. Mr. Dickson discovered, by examining original specimens, that Forster's plant is no other than *Marchantia hemisphærica*, without fructification; the supposed *anthers* being nothing but the hairs of the leaf!

RUPITANI, a name given to the Donatists. See CAM-PITÆ.

RUPOLY, in *Geography*, a town of Bengal; 22 miles W. of Purneah.

RUPPAN, a town of Bohemia, in the circle of Pilsen; 17 miles S. of Pilsen.

RUPPE, a town of France, in the department of the Vosges; eight miles N. of Neufchateau.

RUPPEL, a river of France, formed by the union of the Senne, the Demer, and the Dyle, which joins the Scheldt at Rupelmonde.

RUPPERTSGRUN, a town of Saxony, in the Vogtland; six miles N. of Plauen.

RUPPIA, in *Botany*, was named by Linnæus, in memory of Henry Bernard Ruppian, native of Giessen, a student of physic, who soon gave up that and every other pursuit for botany. Haller characterizes him as "of short robust stature, with the eyes of a lynx, unwearied limbs, a penetrating genius, and most tenacious memory." He travelled through various parts of Germany, living with the mountain cottagers, disdaining every indulgence, except the study of plants. He seems to have died at an early age. The first edition of the *Flora Jenensis*, compiled from his papers, and arranged after the system of Rivinus, which he much approved, was published in 1718, by J. H. Schutte. Another came forth in 1726; and a third, under the care of Haller, with beautiful plates, in 1745. Each makes an octavo volume.—Linn. Gen. 68. Schreb. 92. Willd. Sp. Pl. v. 1. 717. Mart. Mill. Dict. v. 4. Ait. Hort. Hew. v. 1. 281. Pursh 121. Sm. Fl. Brit. 198. Prodr. Fl. Græc. Sibth. v. 1. 109. Juss. 19. Lamarck Illustr. t. 90. Gærtn. t. 84. (Buccaferrea; Mich. Gen. 72. t. 35.)—Class and order, *Tetrandria Tetragynia*. Nat. Ord. *Inundatae*, Linn. *Naiades*; Juss.

Gen. Ch. Cal. Perianth none. Cor. none. Stam. Filaments none; anthers four, sessile, equal, roundish, of two roundish valves, bursting transversely. Pist. Germens four or five, nearly ovate, crowded close together; styles none; stigmas obtuse. Peric. none. Seeds four or five, ovate, oblique, each elevated on a long slender stalk, and terminated by the permanent, flat, orbicular stigma.

Eff. Ch. Calyx none. Corolla none. Seeds four, on long footstalks.

1. *R. maritima*. Sea Ruppia. Linn. Sp. Pl. 184. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 136. Lightf. Scot. 124. t. 8. f. 1. (*Potamogeton maritimum*, gramineis longioribus foliis, fructu serè umbellato; Raii Syn. 134. t. 6. f. 1. *Fucus ferulaceus*; Ger. Em. 1573. *Buccaferrea maritima*, foliis acutissimis; Mich. Gen. 72; as well as fol. minus acutis; *ibid.* t. 35.)—Native of salt-water ditches, in most parts of Britain, flowering in July, and ripening seed in August. Dr. Sibthorp observed it in Cyprus, as well as on the classic shore of Argos. Mr. Pursh says it

occurs about the mouths of most rivers in America. The habit of the plant agrees with *POTAMOGETON*; see that article. The root is probably annual. Stems capillary, very much branched, clothed with alternate, linear, more or less pointed leaves, which embrace the stem with a membranous united stipula. Flower-stalks axillary, solitary, simple, variable in length, according to the depth of the water in which the herb grows, and often spiral, accommodating itself to any alteration, that the flowers, which stand two together at the top, one a little above the other, may not be spoiled by immersion. The plant is most distinguishable when in fruit, by means of the singularly stalked, and as it were umbellate, seeds. Dillenius, in his edition of Ray's *Synopsis*, greatly errs in reporting that the flowers, or stamens, grow remote from the fruit, and that the latter appears first.

Labillardiere, in his account of the plants of New Holland, v. 2. 116. t. 264, describes a *Ruppia antarctica*, whose genus he merely conjectured, having seen nothing of the fructification. This is referred, perhaps more properly, though likewise from the habit only, by Mr. Brown, to Decandolle's genus *Caulinia*; see Br. Prodr. Nov. Holl. v. 1. 339.

RUPPIN, NEW, in *Geography*, a town of the Middle Mark of Brandenburg, the capital of a county or circle of the same name, containing two Lutheran churches, and 800 burghers. It is situated on a large lake, formed by the river Rhine, and has considerable manufactures of cloth. "Old Ruppin" is situated on the same lake, opposite to New Ruppin; 30 miles N.N.W. of Berlin. N. lat. 52° 55'. E. long. 12° 55'.

RUPPOLI, a mountain of Etruria; 10 miles S.W. of Florence.

RUPRECHTSHOFEN, a town of Austria; 12 miles S.E. of Ips.

RUPSTA, a town of Sweden, in East Gothland; six miles W. of Linköping.

RUPTORIUM, in *Surgery*, a caustic applied with a view of opening an abscess.

RUPTURE. See HERNIA.

RUPTURE-Wort, in *Botany*. See HERNIARIA.

Although there be no foundation for the virtues ascribed to this plant, and implied in its name in the curing of ruptures; yet there is another case in which German physicians strongly recommend it. It is in the disorder of the eyes which is brought on by reading or writing by candle-light, or by examining nice objects, or very fine work. This distemperature seems to be properly a diminution of sight, without any apparent cause, or visible alteration in the eye, and is probably owing to a viscid matter obstructing the optic nerves, and preventing a supply of their proper fluid. The herniaria, being a gentle and mild attenuant, is supposed to be adapted for the relief of this disorder. Gruhman De Novo Caliginis Remedio.

The author gives many instances of the success of this remedy, and mentions two methods of giving it; the one in powder, and the other in tincture: the former way is preferred, and the method is to gather the herb in its prime, and powder it after it has been dried in the shade; then to sprinkle the quantity of a scruple of this powder on the bread and butter used for breakfast. If this is not liked, the tincture is to be made with spirit of wine, as strong as the plant will make it, and forty drops are to be taken every morning and evening in any liquor.

The distemperature this is proposed to cure is very common, yet this is almost the only thing, as it has been said, that has been prescribed by way of remedy, and deserves to

be fairly tried. But no modern practice seems to warrant the above-mentioned author's recommendation of it.

RUPUTTY, in *Geography*, a town of Hindoostan, in Bahar; 12 miles E. of Chuprah. N. lat. $25^{\circ} 44'$. E. long. $85^{\circ} 11'$.

RURAL, or **RUSTIC**, formed of *rus*, *ruris*, *country*, something that relates to the country.

RURAL Dean, in the *Ancient Church*. See **DEAN**.

RURAL Economy, a term which comprehends the amelioration and improvement of the landed and different other property, habits, and customs of a country, in whatever way or by whatever means of a rural nature they may be capable of being accomplished, as, whether in the laying out, inclosing, and cultivating the ground, or in the management of the different practices, operations, and processes which have a relation to it, or to its produce, the regulation of the various kinds of labour which attends them, as well as that of the sale of the different articles of provisions which are raised from it in the several fairs and markets, and the provision of a variety of substances which are necessary for use as fuel, as well as for many other purposes of the rural kind. In these views, the bettering of the condition of different sorts of land, by the particular modes and practices of husbandry which have been lately discovered, are of very great importance, as well as the improved management in feeding animals, dairying, and making a great number of other articles, and the working of different sorts of quarries and pits for the raising of materials which are useful in various rural intentions, besides those of being consumed as fuel.

There are many other kinds of works, establishments, and constructions which are partly of this nature, and which contribute in no small degree to the general improvement and advantage of a country, such as those of roads, so far as the state, form, and convenience of them are beneficial in this way; the construction of convenient railways for the more ready conveyance of weighty articles of slate, coal, and other kinds of produce; the formation of canals, and the widening and altering of rivers, for the benefit of water-carriage for different bulky matters; and the raising of embankments against the sea, or large rivers, for the better cultivation, protection, and acquisition of land. To which may be added, the establishing of fisheries of different kinds, and improving the management of them, as well as some other undertakings.

The rural habits and practices of a country, which are necessarily either different at different times, in consequence of the changes which are always taking place in the circumstances and conditions of it, or fixed by the hilly and mountainous nature of its surface, are constantly slow in their progress towards the state of amelioration and perfection; on which account, they and the industry of the rural population of a nation ought to be looked upon and considered in respect to what they were formerly at different periods of time, what they are now, and what there is the probability of their becoming by the progress of man in the state of society.

In the infant state of a country, while its riches and resources chiefly consist in the number of herds and flocks which it can support, the attention and exertion of the people are, for the most part, with much propriety, directed to the rearing, feeding, protection, and management of these sorts of live-stock. Afterwards, when the tillage system becomes, in some measure, to be connected and incorporated with the pastoral state, there is a division of their cares and labours, between the cultivation of the soil for the raising of grain, and the attendance on their cattle, flocks, and sheep

flocks. And ultimately, when the benefits and numerous advantages of commerce begin to be known and appreciated, no small part of them leave the cattle and the tillage plan for that of trade, and the manufacturing of different kinds of articles for its use and benefit.

The history of all nations, as well as that of the same nation at different periods of time, furnishes numerous instances in proof of these progressive stages of change in their rural state. It is therefore a great absurdity, as well as error, to stigmatize and reprobate the customs and practices of a people or country, in any one of such stages or changes of their rural means, by the comparison of those of another, as the object of their industry and application is widely different at the different times, and consequently the test by which they ought to be judged of, must be equally different. Thus, the condemnation and reprehension of particular modes, practices, and habits of the rural kind, from preconceived notions peculiar to the situation and way of life in which the persons have been themselves placed, are highly preposterous and foolish, as any one is well employed in pursuing an useful and laudable occupation or undertaking with industry and perseverance, whatever the nature of it may be, whether it be that of tending and managing herds and flocks, or that of conducting some other business, practice, or process, each contributing to the convenience of the community, however different their engagements may be, or the rank which they hold in society.

The practice and custom of attending herds and flocks, which prevailed in a certain stage of society in all countries, was more quickly departed from in cases where the land was suitable for the purposes of tillage than in other instances; but most so on the sea-coasts and the banks of navigable rivers.

Improvements of this nature are always highly deserving the attention and encouragement of the public, on account of the general influence which they have in promoting and bettering the state and condition of society; as they may be said to embrace the introduction of whatever is useful and advantageous, as well as, in some measure, what is ornamental, into a country. These beneficial changes and alterations are accomplished in a great variety of different ways, and by a number of different methods, but principally by the discovery of new means, the cultivation of what has been formerly overlooked or neglected, and by having recourse to superior and more enlightened modes of management in the whole. In this manner a vast increase of produce of different kinds, as well as of national wealth, may be brought forth, and at the same time much ornamental effect and convenience be produced.

RURAL Architecture, the nature of any sort of country building, but principally those of the farm or agricultural kind. See **FARM**.

RURAL Artificers, all those persons who are employed in the making of any sort of tool, implement, or machinery, for the purpose of agriculture, husbandry, or any other rural art or business. The excellencies or defects of these sorts of workmen depend upon their ingenuity and knowledge of the nature of mechanism in general, or their deficiency in both these respects.

Wherever the construction of machinery has made any considerable progress, there is most commonly a portion of the same spirit diffusing itself among the rural artificers of the same neighbourhood; but where this has not happened, the contrary is always the case. It is, however, of vast importance to the farmer and landed interest in general to be in possession of, or capable of procuring, ingenious and intelligent workmen of this description, as the progress

and advancement of the art of farming greatly depends upon it.

The writer of the Agricultural Report of the County of Middlesex has remarked, that not only the common wheelwrights and smiths of that district have no ideas of machinery, or the capacity of executing any thing from drawings or specifications; but that the generality of the farmer's labourers are equally stupid, and unwilling to execute their work in any way to which they are not accustomed. Hence, it is contended, the difficulty of introducing any thing new in the implements or practice of husbandry is almost insurmountable. Even the most trifling alteration, or deviation from the old system or plan, is resisted, it is said, both by the artificers and labourers; and every possible obstruction thrown in the way of the farmers, to prevent what they deem an innovation on the established custom of the place, or part of the county where it may take place. The same is the case in regard to all the more complex kinds of machinery, as it is asserted that it is absolutely impossible to get a plough, a threshing-mill or machine, a winnowing machine, or indeed any other similar sort of implement of husbandry, constructed on a good principle by the artificers of this county; and that it is not much less difficult to induce the labourers to make use of them, when they are brought from any other place at a distance. Thus the farmer is reduced to the necessity of treading in the steps of his forefathers, though the practice may be at war with his own better judgment and inclination; and many useful alterations and improvements in the art of cultivation retarded and kept back.

But though there may be some expert, ingenious, and sensible mechanics in a district, who are capable, and fully competent to execute orders for all kinds of implements and machinery, which may be useful or necessary to the different purposes of agriculture and husbandry, their exertions and labours are often more considerably lessened in utility and value than might be supposed, on account of the unavoidable wear and tear which they undergo, necessarily subjecting them to frequent repairs, which are utterly impossible to be got done in any skilful manner by the common country artificers; and the great inconvenience, expence, and loss of time, which must be sustained by sending them for such purposes to the original constructors of them, who are not unfrequently at a great distance. This is another great drawback on improvements in the practice of farming.

Mere theoretical cultivators, who have not experienced these difficulties and inconveniences, and are so frequently condemning the whole body of farmers as obstinately resisting every attempt at improvement in the art, often display their own want of knowledge and superficialness on the subject, by bestowing that degree of reprobation and censure on the farmer, which ought to have been applied to his labourers and rural artificers.

The proper encouragement of good and expert rural artificers is consequently a matter which tends greatly towards promoting and bettering the state and condition of agriculture, in various essential points, as well as to augment and render its conveniences much more numerous and beneficial.

RURAL Buildings and Seats, in Gardening. See *RE-TREAT* and *SEAT*.

RURAL Gates, in Ornamental Gardening, are such as are employed for ornamenting the entrances to country residences, or other similar purposes. They should have a form and construction, so as in some measure to harmonize and accord with the nature and style of the residence to

which they are to belong; the same general principles being, in some degree, applicable here as in the case of rural lodges. It is indeed suggested, that they both present ample scope for invention, which has been productive of two great evils: the first of which is, that too many designs of this nature have been given to the public; and the latter, that the proprietors and other persons have adopted, copied, and executed them, without any regard to the nature of the situation, or the character of the mansion or residence to which they are to be affixed. It is believed that no person will require proofs of this, who has seen any thing of the country. In regard to what relates to economy and utility in gates for common purposes, it may be seen under the head *GATE*.

RURAL Lodges, are such adorned small buildings as are necessary for the entrances, or other parts of the approaches or drives of country residences. Those for the former, according to the opinion of Mr. Loudon, should be designed and constructed in a character and on principles somewhat analogous to that of the residence to which they belong; while those of the latter, or for the drives, should seldom be more than improved rural cottages, unless the nature of the situation should suggest some peculiarity of form, or description of them. It is supposed, that the notion of appropriating a country, by stamping all such buildings, as well as some others, with something which may denote the continuation of the proprietor's estate, is only calculated to gratify the vanity and ostentation of such persons. The truly great, it is conceived, need nothing to make them appear so; and in the country, they will ever be more assiduous to render themselves agreeable to their neighbours, than to shew the unfociable disposition of monopolizing territory. In regard to their grounds, it is suggested that they will be ready with Marlborough, Argyle, Howard, and other noble proprietors of grand residences, to say with the marquis of Ermeonville, "This, the farm, only is shut up; the three others, the wood, the forest, and the meadow, are open to every body; and I only wish that they should think themselves as much at home as if they belonged to them." On the whole, those sorts of buildings should always partake somewhat of the nature of the situations, and the styles of building in the residences to which they are to be attached. See *COUNTRY RESIDENCE*.

RUREMONDE, or ROERMOND, in *Geography,* a town of France, and principal place of a district, in the department of the Lower Meuse, late of Upper Guelderland, in the Austrian Netherlands, situated at the conflux of the Roer and Meuse. It derives its name from that of the former river and the term *Mondt*, signifying mouth, both expressing its situation at the Mouth of the Roer. It was encompassed with walls and six gates by Otho, surnamed the Cripple, 14th count of Guelderland. In 1290 it obtained from Rodolphus the privilege of coining money; and in 1562 it was created into a bishopric by pope Paul IV., under the archbishopric of Malines. The cathedral is the only parish church. Its magistracy is composed of nine echevins and two secretaries. In 1665 an accidental fire destroyed almost all the houses, convents, and the bishop's palaces. It has been often taken and retaken by the Dutch and Spaniards, in their civil wars; 30 miles N. of Aix-la-Chapelle. The town contains 3788, and the canton 14,621 inhabitants, on a territory of 222½ kilometres, in 20 communes. N. lat. 51° 12'. E. long. 5° 50'.

RUREY, a town of France, in the department of the Doubs; 4 miles E. of Quingey.

RURROW, a town of Hindoostan, in Dooab; 30 miles E. of Etaya.

RUS, a mountain of Arabia, in Yemen; 8 miles S. of Sana.

RUSAZUS, in *Ancient Geography*, a town of Africa, on the coast of Mauritania Cæsariensis, between Rufubirris and Vabar, according to Ptolemy. Pliny gives to this town the appellation of Colonia Augusta; and in the Itinerary of Antoninus it is named Rufazis Municipium, and placed between Iomnium Municipium and Saldis Colonia.

RUSBACH, in *Geography*, a river of Austria, which runs into the Danube, 2 miles above Hainburg.

RUSNACH, *Hoben*, a town of Austria; 9 miles N. of Korn Neuburg.

RUSCEK, a town of European Turkey, in Bulgaria, on the Danube; in which are 20 mosques, 3 churches, and a Jews' synagogue. It is defended by a castle, with a garriſon; 50 miles E. of Nicopoli. N. lat. 53° 52'. E. long. 25° 15'.

RUSCINO, in *Ancient Geography*, a town of Gallia Narbonensis, the capital of the people called Conſuarani. It was in this town that the people of the country assembled, to deliberate on the paſſage demanded by Hannibal, according to Livy, lib. xxi. cap. 24. It was a Roman colony, according to Mela; and Pliny ſays, that it enjoyed the jus Latinum. It was ruined by the Normans, and its name is preſerved in Rouſſillon. In the Itinerary of Antonine, this town was marked on the route from Narbonne to Caſtulo, between Combulta and Ad Centuriones.—Also, a river of Gallia Narbonensis, according to Strabo, who ſays that it had its ſource in the Pyrenées, and watered a town of the ſame name. Ptolemy calls it Ruſcio, and places its mouth between thoſe of the Illiberis and Atages.

RUSCINONA, a port of Africa, whither, according to Dr. Shaw, the Carthaginian ſleet retired, the night before it engaged with Scipio near Utica. This name is ſaid to be of Phœnician origin; the firſt part of it, *Rus* or *Ras*, denoting cape; and the latter, *annonna*, expreſſing the great quantity of corn and provisions that were ſhipped off from this place. Theſe circumſtances lead Shaw to conclude, that Ruſcinona is the preſent "Porto Farina," on the coast of Tunis, called by the inhabitants, from an ancient ſalt-work near it, "Gar-el-Mailah," i. e. the cave of ſalt. This port, eſpecially the Cothon, or inward part of it, is ſafe in all accidents of weather, and opens into a large navigable pond, formed by the Majerdah or ancient *Bagrada*, which at preſent diſcharges itſelf through it, in its way to the ſea. The town belonging to this port was formerly very conſiderable.

RUSCIUD, in *Geography*, a river of Perſia, which runs into the Perſian gulf, 48 miles W. of Ormus.

RUSCUNIÆ COLONIA, *Temendſuſe*, in *Ancient Geography*, a promontory and colony of the eaſtern part of Mauritania Cæsariensis, according to Ptolemy, Pliny, Mela, and the Itinerary of Antonine. Antonine places it 15 miles E. of Icoſium. The ruins are ſtill viſible.

RUSCURIUM, RUSUCCORÆ of Ptolemy, and the *Ruſuccuro* of the Peutingerian Tables, now *Dellys*, formerly an ancient city, but at preſent a ſmall town, of Africa, on the coast of Algiers, ſituated partly at the foot and partly upon the declivity of a high mountain. In a wall, juſt over the harbour, is a ſmall niche, with an image, in the attitude of a Madonna; but the features and drapery, ſays Dr. Shaw, are defaced.

RUSCUS, in *Botany*, an ancient name, whoſe derivation has been given up by moſt authors, as hopeleſs. De Theis juſtly obſerves, that it was originally *Brufcus*, and

this leads him to the Celtic name of the plant in queſtion, *Beufkelen*, equivalent to Box-holly, which is certainly the beſt explanation that has ever fallen in our way.—Linn. Gen. 534. Schreb. 709. Willd. Sp. Pl. v. 4. 874. Mart. Mill. Diſt. v. 4. Ait. Hort. Kew. v. 5. 420. Sm. Fl. Brit. 1073. Juff. 42. Lamarck Illuſtr. t. 835. Gærtn. t. 16.—Clafs and order, *Dioecia Triandria*. (*D. Syngenefia*, Linn. *D. Monadelphica*, Willd.) Nat. Ord. *Sarmentacea*, Linn. *Aſparagi*, Juff.

Gen. Ch. Male, *Cal.* Perianth of fix ovate-oblong, rather ſpreading, convex leaves, reflexed at the ſides. *Cor.* Petals none, except three alternate leaves of the calyx be taken for ſuch. Nectary central, ovate or cylindrical, the ſize of the calyx, hollow, erect, coloured, perforated at the ſummit. *Stam.* Filaments none; anthers three, ſpreading, ſeated on the extremity of the nectary, connected at the baſe. *Piſt.* obſolete.

Female, *Cal.* as in the male. *Cor.* Petals as in the male. Nectary the ſame. *Piſt.* Germen ſuperior, oblong-ovate, concealed within the nectary; ſtyle cylindrical, the length of the nectary; ſtigma obtuſe, projecting out of the oriſice. *Peric.* Berry globoſe, of three cells. *Seeds* two in each cell, globoſe.

Obſ. There is one ſpecies, *R. racemofus*, with united flowers, whoſe calyx is globoſe, with fix ſegments at the mouth only. It is ſeldom that in this genus and its allies, *Smilax*, *Tamus*, *Convallaria*, &c., the ſeeds all come to maturity. One of them commonly ſuffocates the reſt.

Eſſ. Ch. Male, Calyx of fix leaves. Petals none. Nectary ovate, tubular, bearing the ſtamens on its margin within.

Female, Calyx and Nectary like the male. Stamens none. Style one. Berry ſuperior, of three cells, ſeeds originally two in each cell.

The ſpecies of this genus are not in general truly ſhrubby, but biennial evergreens, with perennial roots. Their young ſhoots reſemble alparagus.

The ſubſtance of the herbage is peculiarly hard and rigid. The green colour either dark and opaque, or bright and poliſhed. Flowers in moſt inſtances borne by the leaves.

1. *R. aculeatus*. Prickly Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 560. Woodv. Med. Bot. ſuppl. t. 237. Mill. Illuſtr. t. 96. (*Rufcus*; Ger. Em. 907. Matth. Valgr. v. 2. 555. Camer. Epit. 935.)

β. *R. laxus*; Sm. Tr. of Linn. Soc. v. 3. 334. (*R. flexuoſus*; Mill. Diſt. ed. 8. n. 6.)

Leaves ſharply pointed, flowering on the upper ſide, without a leaflet.—Native of buſhy woody places, throughout the middle and ſouthern countries of Europe, eſpecially on a gravelly or barren ſoil, flowering early in ſpring. Not uncommon in England. The variety β was obſerved at Stoke, near Goſport, by Mr. G. Caley, growing plentifully. This is an old inhabitant of Chelſea garden, and we have no hesitation in adopting profeſſor Martyn's opinion, as to Miller's ſynonym. The root of this ſpecies is branched, and rather creeping. *Plant* truly herbaceous, though ſo firm and rigid. After living one year without flowering, and remaining in leaf all the winter, it dies down to the root, after ripening fruit, in the following autumn. Every part is devoid of pubeſcence. *Stems* about two feet high, round, ſtriated, branched, rather ſpreading. *Leaves* alternate, ſpreading every way, not quite ſeffile, twiſted, hard, ovate, entire, tipped with a ſharp thorn, and bearing a ſolitary pale flower about the middle of their upper ſide. *Nectary* purpliſh. *Berry* ſcarlet, the ſize of

a black currant, with a sweet pulp, enclosing one or two large, shining, globular, horny or semitransparent seeds. The above-mentioned variety has longer, more lax, branches, and elliptical leaves, tapering at each end; but there are many intermediate statés, which connect it with the common kind. Mr. Woodward has rightly observed, that the flower has a real stalk, immersed in the leaf, under the cuticle. We would remark, that the strict union of the leaves and the branches, in this genus, is like that of Mosses, and Ferns, which last they resemble further in mode of inflorescence, and exceed them in firmness of texture.

2. *R. Hypophyllum*. Broad-leaved Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 2. Ait. n. 2. (*Laurus alexandrina* et *Chamædaphne*; Column. Ecphr. 164. t. 165. f. 1.)

β. *R. latifolius*, fructu in medio foliorum extra pendente; Till. Pif. 149. Dill. Elth. 333. t. 251. f. 323.

Leaves flowering on the under side, without a leaflet. —Native of rather hilly situations in Italy. Dr. Sibthorp gathered it also on mount Athos, in shady woods, and took it for the *Χαμαιδαφνη* of Dioscorides, of which we conceive there can be no doubt. The roots are much like those of the foregoing, but the plant is not branched, and the leaves are much larger, more elliptical, with an acute, but not spinous, point. Each leaf bears, from the middle of its under side, a pair of stalked pendulous flowers, whose segments and *nectary* are of a more slender form than in the *aculeatus*. Their stalks are accompanied at the base by a small scaly bractea, but not by any accessory leaf, as in the following. The berries are red.

3. *R. Hypoglossum*. Double-leaved Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 955, unpublished. (*Hippoglossum* Dioscorides, et *Lauro-Taxa* Plinii; Column. Ecphr. 166. *Hypoglossum*; *ibid.* t. 165. *Δαφνη αλεξανδρεια*, Diosc. Sibth.) —Leaves flowering on the upper side, under a leaflet. —Native of Hungary, Italy, mount Athos, and the borders of the Black sea, in bushy, rather hilly situations. Gerarde appears to have cultivated it in 1596. The plant is kept in some curious gardens, where it blossoms imperfectly early in spring, but we have never seen the berries, which in Dr. Sibthorp's figure make a beautiful appearance, being of a deep rich scarlet, the size of black currants. The habit of this species is like the last, but the leaves, though variable in breadth, are commonly narrower, and particularly distinguished by the small leaf on their disk, from beneath which proceeds a solitary, stalked, pale-green flower, with a slender, purplish, curved, furrowed *nectary*. The stems are simple, scarcely a foot high, not quite erect.

4. *R. androgynus*. Climbing Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 4. Ait. n. 4. (*R. latifolius*, è foliorum sinu florifer et baccifer; Dill. Elth. 332. t. 250.) —Stem twining, branched. Leaves flowering at the edge. —Native of the Canary islands, and long cultivated in England, where it proves a hardy green-house plant, flowering most part of the summer. We have never seen this species in such perfection as in the celebrated garden of the late Dr. Fothergill at Upton, where, under the fostering care of his worthy successors, several relics of his collection still remain. The *Rufcus*, trained up the inside of the old green-house, to the height of many feet, makes a very elegant appearance with its broad, ovate, drooping leaves, of a rich shining green, from one of whose margins proceeds a copious tuft of cream-coloured flowers, male and female on the same plant. The berries are described by Dillenius nearly the size of the last, yellowish, and usually solitary, one ripe seed in each.

5. *R. racemosus*. Alexandrian Laurel, or Cluttered Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 5. (*Laurus alexandrina angustifolia ramosa*; Morif. sect. 13. t. 5. f. 4. *L. alexandrina*, fructu è summitate caulium prodeunte; Herm. Lugd. Bat. 679. t. 681.) —Stem erect, branched. Cluster terminal. Flowers united. —Native of Portugal, according to Mr. Aiton. Linnæus was unacquainted with its origin, and Willdenow by mistake, it seems, mentions the islands of the Archipelago, as Dr. Sibthorp did not observe the plant any where in his tour, though he could not possibly have over-looked it at any season of the year. Nothing is more common in shrubberies, and rustic gardens. The stems are bushy, from two to four feet high. Leaves sessile, lanceolate, twisted, of a bright and polished green. Flowers in terminal clusters, pale buff or cream-coloured, the *stamens* and *pistils* complete in each flower, but they afford no great quantity of fruit; except occasionally, in retired country situations, where the herb grows luxuriantly. The berries are orange-coloured.

6. *R. reticulatus*. Reticulated Butcher's-broom. Thunb. Prodr. 13. Willd. n. 6. —“Stem climbing. Leaves ovate, many-ribbed, reticulated. Flowers solitary, stalked.” —Native of the Cape of Good Hope.

7. *R. volubilis*. Twining Butcher's-broom. Thunb. Prodr. 13. Willd. n. 7. —“Stem twining. Leaves ovate-oblong, many-ribbed.” —From the same country. We know nothing of this or the last, but from Thunberg's short definitions.

Miller has a *R. trifolius*, from Zante and the Greek islands, which professor Martyn justly prefers to *Hypophyllum*. The same author describes another species, under the name of *R. frutescens*, gathered by Houftoun near Carthage. This we conceive to be a *Jacquimia*; probably the *rufifolia* of Linnæus.

RUSCUS, in Gardening, contains plants of the shrubby and under-shrubby evergreen kind, of which the species cultivated are, the prickly-butcher's-broom (*R. aculeatus*); the broad-leaved butcher's-broom (*R. hypophyllum*); the double-leaved butcher's-broom (*R. hypoglossum*); the Alexandrian laurel (*R. racemosus*); and the climbing butcher's-broom (*R. androgynus*).

Method of Culture.—These plants are capable of being readily increased by the roots, which send up numerous stalks or suckers, which may be taken up in autumn, winter, or spring in open weather, and divided into many separate sets, each forming a proper plant, though they need not be divided very small unless where a great increase is required, planting the largest at once where they are to remain, and the smallest in nursery rows, &c., when each plant soon increases by offsets, and assumes a bushy growth. They are also capable of being raised from seeds, but they often remain in the ground till the second spring. The seeds of the hardy sort should be sown in any bed or border an inch deep, and the tender kind in pots, placed under shelter in cold weather; and when the plants are a year old, pricking them out in March, the hardy sorts in nursery-beds for two or three years, and the tender sorts in pots.

All the different hardy sorts are proper for being placed out near the verges of shrubberies, or any close plantations, as they thrive under the drip of trees, and remain green the year round. But the last tender sort requires the shelter of a green-house in winter, where it affords variety among other potted plants of that kind.

RUSE, in Geography, a town of European Turkey, in Romania; 60 miles N.E. of Adrianople.

RUSECK, a town of Bohemia, in the circle of Konigin-gratz; two miles N. of Konigingratz.

RUSEI, a town of Walachia, in the Kodmana; 45 miles W. of Bucharest. N. lat. $44^{\circ} 21'$. E. long. $24^{\circ} 47'$.

RUSGUNIA, in *Ancient Geography*, *Rustonum* of Ptolemy, *Ruthifia* of Mela, and *Rufconia* of Pliny and others, a cape near Algiers, on the coast of Africa, now Temendufse, or Metafus, with a tabled land, as the mariners call a flat hillock that rises up in the middle of it. The Turks have here a small castle for the security of the adjacent roads, once the chief station of their navy, where are still the traces of an ancient Cothon, with several heaps of ruins of the same extent with those of Tefessad, and which have no less contributed to the fortification of Algiers.

RUSH, BENJAMIN, in *Biography*, an eminent physician, and professor of the institutes and practice of medicine in the university of Pennsylvania, was born near Bristol, in the state of Pennsylvania, on the 5th of January, 1745. His ancestors belonged to the society of Quakers, and were of the number of those who followed the celebrated William Penn to Pennsylvania, in the year 1683: his grandfather, James Rush, resided on his estate near Philadelphia, and died in the year 1727: his son, who was the father of the subject of these memoirs, inherited both his farm and his trade, which was that of a gun-smith. He died while Benjamin was yet young. His widow, a most excellent woman, upon whom the education of young Rush thus necessarily devolved, placed him, at an early age, under the direction of the late Rev. Samuel Finley, at West Nottingham, in Chester county, Pennsylvania, by whom he was taught the rudiments of classical knowledge. Dr. Finley, afterwards better known as the president of Princeton college, New Jersey, was an able scholar and faithful teacher, and, being also related to Mrs. Rush, may be supposed to have paid great attention to the improvement of his young pupil. But whatever may have been the assiduity with which his education was directed by his preceptor, he possessed an ardent desire for knowledge, and was most unwearied in the pursuit of it.

From the academy of Dr. Finley he was removed to the college of Princeton, where he finished his classical education, and was admitted to the degree of A. B. in 1760, when he had not yet completed his sixteenth year. He was now left to choose a profession, and in the choice which he made, he doubtless was actuated by conscientious motives. He seems to have fully known his own character, and to have formed a proper estimate of his talents, and by applying them to the science and practice of medicine, to have been desirous of doing all possible good to the family of mankind. That he was directed by these motives, may be inferred from his own opinion of the utility of medicine. "So great," says he, "are the blessings which mankind derive from it, that if every other argument failed to prove the administration of a providence in human affairs, the profession of medicine would be fully sufficient for that purpose."

He accordingly, soon after leaving college, placed himself under the care of the late Dr. John Redman, of Philadelphia, a gentleman who had deservedly obtained an extensive share of professional business, and who was justly considered an excellent practitioner. With Dr. Redman young Rush continued some time, zealously engaged in the acquisition of the several branches of medicine. At that day, however, no institution for the purpose of medical instruction was established in Philadelphia, and his thirst for knowledge being rather excited than gratified with what he had learned from his preceptor, he formed the resolution of

going abroad in order to avail himself of those advantages which were not within his reach in his native country. The university of Edinburgh, at that time, was at the zenith of its reputation, and justly boasted of its able professors, among whom were the elder Munro, the elder Gregory, Dr. Cullen, and Dr. Black. Thither Rush repaired, and was graduated M.D. in 1768, after having performed the usual collegiate duties with much honour, and published his inaugural dissertation "*De Concoctione Ciborum in Ventriculo.*" In this performance he candidly acknowledged himself indebted, for many of the opinions which he advanced, to his distinguished teacher Dr. Cullen.

About the period of Dr. Rush's return to his native country, the first attempt was made in Philadelphia for the organization of a medical school. Lectures on anatomy and surgery had indeed been delivered in that city, in 1763 and 1764, to a small class of pupils, by the late Dr. William Shippen, who, two years before, had returned from Europe, where he had completed his education under the direction of the celebrated Dr. William Hunter; and, in 1765, Dr. John Morgan, also, gave instruction on the institutes of medicine and the practice of physic. Three years after this, the venerable Dr. Kuhn, who had been a pupil of the illustrious Linnæus, and had preceded Dr. Rush in his medical honours at Edinburgh only one year, was made the professor of botany and the materia medica. To this list of teachers, Dr. Rush himself was added as professor of chemistry, immediately upon his arrival from England in 1769. Such was the first organization of the medical college of Philadelphia.

That Dr. Rush had, in an eminent degree, the qualifications of a teacher, and discharged with exemplary fidelity the important duties belonging to the elevated station to which he was chosen, the popularity attending his lectures, the yearly increase in the number of his hearers, and the unexampled growth of the college with which he was connected, bear ample testimony. Shortly after this period, he was elected a fellow, and also one of the curators of the American Philosophical Society.

While Dr. Rush was thus engaged in the active pursuits of his profession, the dispute of the then American colonies with Great Britain arose. Considering the claims of the British government unjust, he entered with warmth into the defence of the rights of his countrymen. His talents were already well known, and the fullest confidence was placed in his integrity and patriotism. The crisis demanded his services; and in the year 1776 he was chosen a member of congress for the state of Pennsylvania, and, on the 4th of July, with eight other delegates from that state, he signed the instrument of independence. Upon the 11th day of April, 1777, he was appointed surgeon-general of the military hospital in the middle department. His colleague in the medical school, Dr. Shippen, on the same day was appointed director-general of all the military hospitals for the armies of the United States, and Dr. J. Jones was made physician-general of the hospital in the middle department. The office of surgeon-general was not long held by Dr. Rush, for upon the 1st of July, 1777, he was created physician-general of the hospital, in the middle department, in the room of Dr. Jones.

On the 6th of February ensuing, Dr. Rush resigned the station of physician-general, and Dr. William Brown was appointed in his place.

Doctor Rush, however, still continued to take an active part in the politics of the state to which he belonged. The original government of Pennsylvania is known to have been perfectly unique in its form, and the constant source of in-

calculable mischief. The house of representatives, chosen annually by the people, and on which there was no check, was the sole legislative power; and each succeeding assembly often made it their business to undo all that their predecessors had done. This kind of government was justly reprobated by Dr. Rush, and the necessity and wisdom of a reformation in it were too apparent not to be attempted. Dr. Rush, and many other distinguished abettors of the cause, had soon after the satisfaction of seeing a new form of government established in Pennsylvania, by a general convention of the people.

Soon after, he formed the resolution of retiring from political life, and of devoting the remainder of his days, with increased ardour, to his profession. He was still further induced to this resolution, from the consideration of the state of medicine in his native country at that time, which, it is scarcely necessary to remark, was in a very low condition. Happy for medical science and the interests of humanity, that he so early formed such a resolution, and that he was so steady, uniform, and indefatigable in the accomplishment of it!

During the long and brilliant career of Dr. Rush's life, from this time to its termination, he may be considered as exclusively occupied in duties pertaining to his profession, and not unlike another Howard, in "surveying the mansions of sorrow and pain," and in mitigating and removing the distresses of all within his power. His biography, therefore, like that of most other scientific men, consists chiefly in a history of his professional labours. How numerous and important his services, as an author, have been, will be readily seen from a brief detail of his writings, which we shall attempt to give, as nearly as practicable, in chronological order.

The first fruits of his professional labours, as an author, was an account of the effects of the Stramonium, or thorn apple; this appeared in the year 1770, and was published in the Transactions of the American Philosophical Society, vol. i. The same year he addressed a letter, on the usefulness of Wort in ill-conditioned ulcers, to his friend Dr. Huck, of London, which was published in the Medical Observations and Inquiries of London, vol. iv. In 1774 he read, before the Philosophical Society, his interesting Inquiry into the Natural History of Medicine among the Indians of North America, which formed the subject of an anniversary oration. He this year again addressed another letter to Dr. Huck, containing some remarks on Bilious fevers, which was printed in the London Medical Observations and Inquiries, vol. v. To this succeeded his Account of the Influence of the Military and Political Events of the American Revolution upon the Human Body, and Observations upon the Diseases of the Military Hospitals of the United States, which his situation in the army eminently qualified him to make. In 1785 he offered to the Philosophical Society of Philadelphia an Inquiry into the Cause of the Increase of Bilious and Intermitting Fevers in Pennsylvania, published in their Transactions, vol. ii.; and soon after, in quick succession, appeared Observations on Tetanus, an Inquiry into the Influence of Physical Causes upon the Moral Faculty, Remarks on the Effects of Ardent Spirits upon the Body and Mind, and his Inquiry into the Causes and Cure of the Pulmonary Consumption. About this time, also, appeared his paper entitled Information to Europeans disposed to migrate to the United States, in a letter to a friend in Great Britain; a subject which had already occupied the attention of Dr. Franklin, but which Dr. Rush considered still further deserving notice, on account of the important changes which the United States had

lately undergone. To this paper followed his Observations on the Population of Pennsylvania, Observations on Tobacco, and his Essay on the Study of the Latin and Greek Languages, which was first published in the American Museum of Philadelphia. This last-mentioned paper, which has been the fertile topic of much animadversion, was, with several other essays of Dr. Rush, and his Eulogiums on Dr. Cullen and the illustrious Rittenhouse, the former delivered in 1790, the latter in 1796, embodied in an octavo volume, entitled Essays, Literary, Moral, and Philosophical, and published in 1798.

In 1791, the medical colleges of Philadelphia, which, on account of certain legislative proceedings, had existed as two distinct establishments since the year 1788, became united under the name of the University of Pennsylvania; and Dr. Rush was appointed to the chair of the professorship of the institutes of medicine and clinical practice. He now gave to the public his Lectures upon the Cause of Animal Life. The same year he presented the Philosophical Society his Account of the Sugar Maple Tree of the United States, which was published in their Transactions, vol. iii.; and in 1792, Observations, intended to favour a supposition that the Black Colour of the Negro is derived from Leprosy; published in their Transactions, vol. iv.

The year 1793 is memorable in the medical annals of the United States, on account of the great mortality occasioned by the yellow fever, which prevailed in the city of Philadelphia; and the history of that epidemic, which was published by Dr. Rush in 1794, cannot be too highly valued, both for his minute and accurate description of the disease, and the many important facts he has recorded in relation to it. It was comprised in one volume octavo, and has undergone several editions, and been extensively circulated in the Spanish and in the French languages. About this period, also, he offered to the medical world his observations on the Symptoms and Cure of Dropsy in general, and on Hydrocephalus Internus; an Account of the Influenza, as it appeared in Philadelphia in 1789, 1790, and 1791; and Observations on the State of the Body and Mind in Old Age. In 1797 came out his Observations on the Nature and Cure of Goat, and on Hydrophobia; an Inquiry into the Cause and Cure of the Cholera Infantum; Observations on Cynanche Trachealis, &c.

It is proper to state, as connected with the literary labours of Dr. Rush, that in 1788, many of his medical papers were collected together, and that he offered them to the public under the title of Medical Inquiries and Observations, vol. i. These he, from time to time, continued, embracing most of the writings above enumerated, besides observations on the climate of Pennsylvania, and some others, until a fifth volume was completed in 1798. In 1801 he added to his character as a writer, by the publication of six Introductory Lectures to a course of Lectures upon the Institutes and Practice of Medicine, delivered in the University of Pennsylvania. In 1804 a new and corrected edition of his Medical Inquiries, &c. was printed in four volumes, octavo. In 1806 he also published a second edition of his Essays. In 1809, such was the demand for the Medical Inquiries and Observations, he again revised and enlarged the work throughout, and enriched the medical profession with a third edition. In this edition he continued his several histories of the yellow fever, as it prevailed in Philadelphia from 1793 to 1809. It also contained a Defence of Blood-letting, as a Remedy for certain Diseases; a view of the comparative state of Medicine in Philadelphia between the years 1760 and 1766, and the year 1809; an Inquiry into the various sources of the usual forms of Summer

mer and Autumnal Diseases in the United States, and the means of preventing them; and the recantation of his opinion of the Contagious nature of the Yellow Fever.

He now formed the idea of selecting some of the best practical works for republication in America, and in order to render them more useful, of adding to them such notes as might the better adapt them to the diseases of his own country. His editions of Sydenham and of Cleghorn were published in 1809, and in 1810 appeared those of Pringle and Hillary. In 1811 appeared a volume of Introductory Lectures, containing those he had formerly published, with ten others delivered at different years before his class, and also two upon the pleasures of the senses and of the mind. His work upon the Diseases of the Mind, which had long and ardently been looked for, was next added to his writings. It appeared towards the close of 1812, in one volume octavo. The last effort of his pen was a letter on Hydrophobia, containing additional reasons in support of the theory he had formerly advanced, as to the seat of the disease being chiefly in the blood-vessels. It was addressed to Dr. Hofack, and written not many days before his fatal illness.

While thus assiduously engaged in enriching medical science with the valuable fruits of his long and extensive experience, and in the active discharge of the practical duties of his profession, he was, on the evening of the 13th of April, seized with symptoms of general febrile irritation, which were soon accompanied with considerable pain in his chest. His constitution was naturally delicate, and he had acquired, from previous illness, a predisposition to an affection of his lungs. He lost a moderate quantity of blood, by which he felt himself considerably relieved. But his strength was not sufficient to overcome the severity of his complaint; the beneficial effects resulting from the most skillful treatment were but of temporary duration. His disease rapidly assumed a typhus character, attended with great stupor, and a disinclination to conversation. In other respects, however, he retained his faculties, and the perfect consciousness of his approaching dissolution. On Monday evening ensuing, after a short illness of five days, and in the 69th year of his age, he ended his truly valuable and exemplary life. His death was the subject of universal lamentation, and he was followed to the grave by thousands, who assembled to bear testimony to his excellence.

In January, 1776, he married Miss Julia Stockton, daughter of the Hon. Judge Stockton, of New Jersey, a lady of an excellent understanding, and whose amiable disposition and cultivated mind eminently qualified her as the companion of Dr. Rush. Thirteen children were the fruits of their marriage, nine of whom still survive. Two of these are chosen to offices of high respectability in the general government of the United States.

It were no easy task to do adequate justice to the great talents, the useful labours, and the exemplary character of Dr. Rush. From the preceding sketch, it is presumed, some idea may be formed of his incessant devotedness to the improvement of that profession of which he was so bright an ornament. His merits, as a practitioner, are too well known to need particular notice; he was fully aware of the great responsibility attached to the medical character, and uniformly evinced the deepest solicitude for the recovery of his patient. His kindness and liberality in imparting aid to those from whom no remuneration was ever to be expected were unbounded, and arose from the generous impulse of his nature, the cordial concern he felt in whatever affected the interests of his fellow creatures. His mind was of a superior order: to a perception naturally ready and acute, he

united a discriminating judgment, a retentive memory, which was greatly improved by habits of close attention, a brilliant imagination, and a highly cultivated taste. He possessed a comprehensive understanding; his knowledge was varied and profound, and he eminently excelled in the several departments of his profession. In his assiduity and perseverance in the acquisition of knowledge he had no superior, and few equals. Accustomed to constant and regular exercise, his intellectual powers acquired additional vigour from employment. Notwithstanding the great fatigue he had to undergo in the discharge of the practical duties of a laborious profession, and the constant interruptions to which he was exposed, when engaged in his pursuits as an author, he never for a moment abated of his ardour in the cause of science. His habits of punctuality to every kind of business in which he was employed, added to a judicious arrangement of time for his multifarious occupations, secured to him sufficient leisure for the publication of those works which have given such celebrity to his name.

His writings claim our attention, both on account of their extent and their variety. Instead of being a mere collator of the opinions of others, he was constantly making discoveries and improvements of his own, and from the results of his individual experience and observation, added more facts to the science of medicine, than all who had preceded him in his native country. His description of diseases, for minuteness and accuracy of detail, cannot be exceeded, and may safely be regarded as models of their kind. His volume on the diseases of the mind, as far as it exhibits the infinitely varied forms which those diseases exhibit, is a storehouse of instruction. Had his labours been limited to these subjects alone, his character would deservedly have been cherished by future ages. His reputation, however, will permanently depend upon his several histories of the epidemics of the United States, which have rendered his name familiar wherever medical science is cultivated, and will hereafter cause to be inscribed upon the same imperishable column that bears testimony to the merits of Sydenham and Boerhaave, the illustrious name of Benjamin Rush. The respect and consideration which his publications procured for him among his contemporaries, were such, that the highest honours were accumulated upon him in different parts of Europe, as well as in his own country, and he was admitted a member of many of the most distinguished literary and philosophical associations.

There are other qualities which still more entitled Dr. Rush to our respect and esteem. In private life, his disposition and deportment were in the highest degree exemplary. Admired and courted for his intellectual endowments, he riveted to him the affections of all who enjoyed the pleasure of an intimate acquaintance. The affability of his manners, the amiableness of his temper, and the benevolence of his character, were ever conspicuous. He was ardent in his friendships and forgiving in his resentments, and yet entertaining a due regard for himself and a high sense of honour, he possessed a manly independence of spirit which disdained every thing mean and servile. He had an extraordinary command of language, and always imparted his thoughts in a peculiarly impressive and eloquent manner. Those who had the happiness to experience the delights of his conversation, will long recollect, with pleasure, his unassuming modesty, and the rich stores of knowledge he poured forth on the most instructive topics. Even when his opinions were solicited, they were given, not as the dictates or admonitions of a superior, but as the kind advice of a friend and equal. He never evinced any of that haughtiness and affectation of importance, which sometimes attaches to

men of eminence, and which so materially lessens the pleasures and comforts of social life.

He was a believer in Christianity from an examination of its principles and the deepest conviction. The purity of its doctrines, and the excellence of its precepts, were a frequent topic of his conversation; its practical influence upon his conduct through life he often acknowledged, and cherished with a fervent hope the animating prospects it affords. His writings, in numerous places, bear testimony to his Christian virtues; and in a manuscript letter, written a short time previous to his fatal illness, and now before the writer of this imperfect sketch, he candidly declares that he had "acquired and received nothing from the world which he so highly prized as the religious principles he received from his parents." It is peculiarly gratifying to observe a man so distinguished in a profession in which, by the illiberal, religious scepticism is supposed to abound, directing his talents to the maintenance of genuine piety, and the enforcing of Christian virtue. To inculcate those principles which flow from the source of all truth and purity, and to impart them as a legacy to his children, was an object dear to his heart, and which he never failed to promote by constant exhortation and the powerful influence of his own example.

There is one particular circumstance in the character of Dr. Rush, which we cannot permit to be passed over without observation; we allude to the union, so eminently conspicuous in him, of the eminent practitioner, and the able and voluminous writer. But our limits will not allow us to enlarge. The materials of the above biographical article have been extracted from the American Medical and Philosophical Register, conducted by Dr. Hosack and Dr. Francis, of New York; July, 1813.

RUSH, in *Botany*. See JUNCUS.

Rushes always indicate a deepish rich soil, and they thrive most in land that is too wet and cold for most other plants. It has been observed that plants of the rush kind may be easily removed by preventing the stagnation of moisture near the surface by judicious under or surface draining, and the application of substances of the saline or calcareous kinds, as ashes, lime, drift from the roads, and other similar materials. These are best made use of in a dry season in either the autumn or spring, but the latter is probably the best; as these absorbent materials will thereby be made use of at the time such plants begin to shoot and establish themselves, and when there will be the least danger of their operation being lessened or prevented by too great a degree of moisture. It has been stated by Mr. Kent, that in naturally coarse meadows, or such as become so in consequence of rushes growing upon them before they have been rendered sufficiently dry by draining, it forms a great improvement to apply a thin coat of sand evenly over the surface of them in the proportion of from twenty to thirty common loads. By this means the sward is rendered much finer, and a much better sort of herbage brought up, white clover being predominant in most cases. And there is still another method, that, in particular situations, may be more easy and convenient, and which has been found to quickly destroy plants of this coarse kind by bringing up those of a finer description. It is a mode that may, at first, seem singular to those who have not seen its sudden and astonishing effects. It is that of conducting water over the surface of such ground; but in this intention it should not be suffered to have the least degree of stagnation, but be conveyed off with as much expedition as possible, by suitable drains being made. Frequent cutting over while in their young growth has also been found useful in destroying them.

Another method of destroying rushes is to fork them up

clean by the roots in July, and after having let them lie a fortnight or three weeks to dry, lay them in heaps and burn them gently, and the ashes which these afford will be tolerable manure for the land; but, in order to prevent their growing again, and to make the pasture good, the land should be drained, otherwise there will be no destroying them entirely; but after it is well drained, if the roots are annually drawn up, and the ground kept duly rolled, they may be subdued. Miller.

RUSH, *Flowering*, or *Water Gladstone*. See BËTOMUS.

RUSH, *Lesser Flowering*. See SCHEUCHZERIA.

RUSH, *Round, Black-headed, Marjib, or Bog*. See SCHÖENUS.

RUSH, *Sweet*. See ACORUS.

RUSH-GRASS. See SCIRPUS.

RUSHES, *Petrified*. What is usually called by this name is a kind of fossil coral. But we have in England, also, another not uncommon substance, frequently called by the same name: this is an incrustation of sparry matter, in the form of a stony crust on the outcrops of real rushes; though, in this case, it is no real petrification, but only a covering of this stone-like matter.

Incrustations and petrifications are usually confounded together, and the generality of people do not attend to the distinction, which is, that in a real petrification, the stony matter penetrates the very substance of the body, as is the case in the petrified wood of Ireland, and other places; whereas, in these incrustations the substance itself remains unaltered within, and its outer part alone is covered with the stony substance; this is the case with what is called the petrified moss at Scarborough, and in other parts of England, and this is the case in regard to what we call sometimes petrified rushes.

RUSH, in *Rural Economy*, a term signifying a tuft, cluster, or a knot of plants of the corn or grais kind.

RUSHES is also a term provincially applied to the wire rush.

RUSH, in *Geography*, a fishing-town of the county of Dublin, Ireland, well situated for carrying on business to advantage. The ling cured here, of which much is exported, is celebrated for its superior flavour. It is situated on a point of land projecting into the Irish sea; $13\frac{1}{2}$ miles N. by E. from Dublin.

RUSH, *The*, a sand-bank near the E. coast of Ireland, and county of Wexford, about four miles long, and hardly one broad; a little to the south of Glascarrick Point.

RUSHA, a small island near the W. coast of Scotland. N. lat. 58° . W. long. $2^{\circ} 20'$.

RUSHIN, or CASTLE RUSHIN. See CASTLE-TOWN.

RUSHWORTH, JOHN, in *Biography*, was born in or about the year 1607, somewhere in the county of Northumberland. Of the early part of his education we have no account. He was some time a student in the university of Oxford, after which he entered himself at Lincoln's Inn, and was called to the bar. He was, however, more attached to politics than to the pursuits of the profession, and was almost perpetually an attendant on the parliament, star-chamber, and other courts, taking notes, in short-hand, of the proceedings at those places. In the troubles of that period he attached himself to the parliamentary and presbyterian parties, and in 1640 he was admitted an assistant clerk of the house of commons. He soon gained the confidence of the house, and, during the king's residence at York, was employed to convey to him its addresses and messages, on which occasions he is said, even at that period, to have rode from London to that city in 24 hours. For these services he was recommended by the house

to a place in the excise. In 1643 he took the covenant, and for Thomas Fairfax, to whom he was nearly related, being made general of the parliamentary forces, appointed Mr. Rushworth to be his secretary. In this situation he was very zealous and active in performing his duties, public and private. In 1649 he attended Fairfax to Oxford, where he was created M.A. as a member of Queen's college. When Fairfax resigned his commission, Rushworth took up his residence in London, and was nominated in 1652, by the house of commons, one of the commissioners to reform abuses in the common law. At this time he was engaged in the compilation of his "Historical Collections," of which the first part appeared in 1659, dedicated to Richard Cromwell, at that time Protector. He was at this period member of parliament for Berwick-upon-Tweed. In 1660 he was appointed one of the clerks of the new council of state. After the Restoration, he endeavoured to ingratiate himself with Charles II. by presenting to him several books of the privy-council during the former reign, which he had preserved from destruction, for which, however, he probably received no higher reward than that of thanks. In 1667, Sir Orlando Bridgeman, keeper of the great seal, made him his secretary, when he was again elected representative for Berwick in the parliament of 1678-9, and the subsequent one held at Oxford. After the dissolution of the latter, having always been careless of his private affairs, he fell into necessitous circumstances, and lived in great obscurity in Westminster, assiduously employed in his Collections, of which he published the second part in 1680. He was at length arrested for debt, and committed to the king's bench prison, where he spent, in great wretchedness, the last six years of his life. He died in 1690, at the age of 83. He had several daughters, one of whom was married to Sir Francis Vane. The "Historical Collections" of this author include private passages of state, weighty matters of law, remarkable proceedings in parliament, &c. and they commence in the reign of King James, in the year 1618, and were brought down to 1740. The third and fourth parts, printed from his MSS., extend to the death of Charles I. in 1648-9. The whole was reprinted uniformly in 7 volumes, folio, in 1721. Of his Collections, the writer in the *Biographia Britannica* says, all that have written on the Puritan or Presbyterian side have highly extolled, nay almost idolized them; such as Coke, Rapin, Oldmixon, &c. Others, on the contrary, who were favourers of King Charles I. and his cause, condemn them as extremely partial, and have discredited them as much as possible. But the person who professedly set himself to oppose them was John Nalson, L.L.D., who published, by command of King Charles II., "An Impartial Collection of the great Affairs of the State, from the Beginning of the Scotch Rebellion in the Year 1639, to the Murder of King Charles I." &c. Dr. Nalson did not continue his history lower than January 1641-2. He brings four capital accusations against Rushworth, *viz.* that he does not inform us whence he had his materials, and therefore that his facts do not stand upon sufficient authority;—that he prints false and erroneous copies of some papers;—that, under the colour of epitomizing others, he has not only obscured, but, in many places, corrupted and disguised the sense;—and that he has recorded little but what relates to the justification of those whom he favours, and their proceedings, omitting what might serve to manifest the king's innocence. In a compilation of such extent, it is no wonder there should be errors, and the writers of the "Parliamentary History" have taken pains to frame a long list of his mistakes, which is copied in a note to the article RUSHWORTH, in the *Biog. Brit.*; they, however, attribute them rather to the negligence

and ignorance of transcribers, than to wilful misrepresentation. It can, however, scarcely be expected that a man, writing as he did, should be free from partialities, or that his personal attachments should not enter into his work. Besides, it is certain that the first part of his work was submitted to the revision of Oliver Cromwell, who being too much occupied to examine it himself, put it into the hands of Whitelock, under whom it underwent various alterations. Nevertheless, Mr. Rushworth professes great impartiality and faithfulness, assuming that he must be in possession of a sufficient degree of knowledge and information for all the objects he had in view; and he, moreover, gives himself as an instance, that it is possible for a man to be of a party and not partial. The value of the "Historical Collections" arises from their having preserved together several detached pieces, which otherwise would have been lost, and from being the fullest compilation during the period of which they treat. *Biog. Brit.*

RUSHY LAND, in *Agriculture*, that which is much infested and troubled with the growth of rushes upon it. Lands of this nature and quality prevail in many places to very considerable extents, which, when properly reclaimed and managed, constitute extremely good meadows and pastures. They are also, in some cases, capable of being broken up and converted to the purpose of tillage, with great advantage.

In many instances of this nature, very great benefit has been derived from a thick covering of chalk rubbish, or the rubbish of lime-stone and free-stone quarries, applied in a considerably reduced or powdery state, after the land had been sufficiently freed from stagnant water by means of pipe or other kinds of under draining, as such heavy materials soon sink in the ground, and by consolidating it are the cause of bringing up another sort of better plants of the grass kind. When such rushy lands have once acquired a certain state and degree of firmness by these or any other means, they may be further benefited and improved by rolling, and close feeding down with sheep stock, which should be confined on particular portions of them, in great numbers, in order to insure the fullest effect and advantage.

It is better likewise, where they are capable of it, to let these sorts of lands remain for some years in the state of pasture, than to bring them directly under the mowing system; as, in that way, they are constantly advancing to a more solid and finer state of herbage, whereas under the contrary practice, they are invariably getting more open, loose, and coarse in their produce. See RUSH.

RUSIBIS PORTUS, in *Ancient Geography*, a port of Africa, in Mauritania Tingitana, between the mouth of the river Cofa and that of Afama, according to Ptolemy. It is called *Rutubis Portus* by Pliny.

RUSICADA, SIGGATA, a town of Africa, according to Mela and Ptolemy. It was situated towards the middle of the gulf of Numidia, about 30 miles E. of Collops Magnus. In the Itinerary of Antonine, this town is placed in Mauritania Cæsariensis, upon the route from Carthage to Leninx, between Chuli Municipium and Paratianæ. Here are some remains of antiquity. Its cisterns serve as a corn magazine.

RUSICIBAR, a town of Africa, in Mauritania Cæsariensis, between Rusonium and Mødunga, according to Ptolemy. Antonine calls it Rusubbicari, and in the Pentegeian Tables it is Rufibricari Matidix.

RUSIN, in *Geography*, a town of Bohemia, in the circle of Schlan; 4 miles N. W. of Prague.

RUSK, AL, a town of Curdistan; 18 miles S.E. of Amadich.

RUSKO, a town of Sweden, in the government of Abo ; 6 miles N.W. of Abo.

RUSKOBAGAN, the Indian name of Parker's island in Kennebeck river.

RUSKY, or RUSKYBRIDGE, a small post-town of Ireland, in the county of Leitrim, where there is a bridge over the Shannon. It is 67 miles N. by W. from Dublin, and 7 from Longford.

RUSLAM RIVER, a river of Upper Canada, which runs into lake St. Clair, between Point aux Roches and Belle river ; it is navigable by a loaded boat six miles upwards. The land on its banks is very good, and at the distance of a few miles in ascending it there is an Indian settlement.

RUSMA, in *Natural History*, the name given by the Eastern nations to the substance called by the ancient Greeks *forj*, and used as a depilatory.

The Turks call this substance *rufma*, and the Arabians *nouret*. It is not, as some have imagined, a mineral substance found ready for use, as a depilatory, in the bowels of the earth ; but it requires a preparation and an alloy to give it that property. Bellon, who first described (at Cuta, in Galatia,) "the source of a mineral which they call *rufma*," adds, that this mineral alone cannot be used "till it has been beaten into a very fine powder, putting half as much quick-lime as *rufma*, which is then diluted in a vessel with water." Thus, the *rufma* of Bellon is not of itself a depilatory ; but it contains some caustic matter, which being mixed with lime, gives it that property. This presumption is confirmed by M. Vermont de Bomare, who, having received from Constantinople some small pieces of mineral *rufma*, perceived, that on throwing it upon hot coals, there immediately exhaled from it a vapour, which gives reason for suspecting that it is a "colchitis" mineralized by sulphur and arsenic. This mixture is the true *rufma* of the Turks, and the *nouret* of the Arabs. There are different names of the same substance, or rather of the same composition. It is, in fact, with arsenic or orpiment, mixed with quick-lime, that the drug for taking off the hair is prepared in the Egyptian baths. The proportion is seven parts of lime to three of orpiment. It is necessary for the person who desires to use it, to keep in a very warm place, such as the hot baths of the East, in which a profuse sweat exudes from all parts of the body. The mixture is diluted with water, and lightly rubbed on the parts from which the hair is to be taken off. After a few moments, it will be seen if the hair be loosened ; it can then be plucked out without pain, and the skin is afterwards washed with hot water. Care must be taken, however, that this liniment does not remain on too long, because it would burn the skin. This does not prevent the hair from growing again, and at the end of some time the operation must be repeated.

Mr. Boyle tells us, he made a fine powder of equal parts of *rufma* and quick-lime, and letting them soak a little time in water, they became a soft paste, which he spread on the part he would free from hair ; and after letting this paste lie on about three minutes, he wiped it off with a wet cloth, and found the hair taken away by the roots without any inconvenience to the part.

RUSOER, in *Geography*. See RISOER.

RUSOOLPOUR, a town of Hindoostan, in Allahabad ; 35 miles N. of Gazypour.

RUSPACH, a town of Austria ; five miles S. of Sonneberg.

RUSPÆ, SHE-AH, in *Ancient Geography*, a town of Africa, on the gulf of Numidia, according to Ptolemy, situated between Achola and Brachodes Externa ; six miles S. of Achola. Some ruins still remain.

RUSPEN, in *Geography*. See ROSZWEIN.

RUSPINA, SAHALEEL, in *Ancient Geography*, a town of Africa, on the gulf of Numidia, between Leptis Minor and Adrumettium, according to Ptolemy. It was situated on the declivity of an eminence about a mile from the sea, S.E. of Adrumettium. It is known by some ancient remains.

RUSPONO, in *Commerce*, a gold coin of Tuscany, which is a piece of 3 sequins, weighing 8 denari 21 grani, Florence weight, and passing for 40 lire or 60 paoli. In gold and silver weight, the pound contains 12 ounces ; the ounce, 24 denari or 576 grani. This pound weighs 11 oz. 2 deniers 8 grains, French poids de Marc, or 5241 English grains ; so that 100lbs. of this weight answer to 91lbs. English troy weight. The assay and value of the *ruspono* are as follow : compared, as to fineness, with the English standard of 22 carats, and as to value with the mint price of gold in England, *i. e.* 3*l.* 17*s.* 10½*d.* per oz. standard, *viz.*

	Assay.	Weight.	Contents in pure Gold.	Value in Sterling.
	car. gr.	oz. dwt. gr.	grains.	<i>L. s. d.</i>
Ruspono	B. 1 3¾	0 6 17¼	160.8	1 8 5½
Zecchino, or sequin	B. 1 3¾	0 2 5¾	53.6	0 9 5¾
Ruspono of Etruria	B. 1 3¾	0 6 17¼	161.6	1 8 6

The impressions on the *ruspono* are a lily, with the name and title of the reigning prince, thus : FERDINANDUS III. D. G. A. A. M. D. ETR. that is, *Dei Gratia Archidux Austriae, Magnus Dux Etruriae*, (Ferdinand III. by the grace of God, archduke of Austria, grand duke of Tuscany) ; reverse, a figure representing St. John the Baptist ; legend, s. JOANNES BAPTISTA. Some pieces, coined about the year 1738, bear the head of the reigning prince ; legend, FRANCISCUS III. D. G. LOTH. BAR. ET M. ET. D. REX HIER. (Francis III. by the grace of God, duke of Lorraine and Bar, grand duke of Tuscany, king of Jerusalem) ; reverse, arms of the prince ; legend, IN TE DOMINE SPERAVI, (in thee, O Lord, have I hoped).

The new *ruspono* of the kingdom of Etruria bears the same impressions as above ; legend in those coined in 1803, LUDOVICUS I. D. G. HISP. INF. REX ETRURIAE, (Louis I. by the grace of God, infant of Spain, king of Etruria) ; and in those struck in 1804, CAROLUS I. D. C. REX ET M. ALOYSIA R. RECTRIX, (Charles I. by the grace of God, king of Etruria, and Maria Louisa queen regent).

The sequin of Tuscany has the same impression as the *ruspono*.

RUSS, in *Geography*, a town of Prussian Lithuania, and principal place of a district, situated at the mouth of the river Ruffe ; 20 miles N.W. of Tilsit.—Also, a small island in the East Indian sea, near the W. coast of Naslau. S. lat. 2° 53'. E. long. 99° 48'.

RUSSE, a river of Prussia, one of the branches of the Memmel, which runs into the Curisch Haff.

RUSSELE'E, a town of Asiatic Turkey, in the province of Diarbekir ; 58 miles S. of Mosul.

RUSSELIA, in *Botany*, received that name from Jacquin, in honour of Dr. Alexander Ruffel, for many years physician to the English factory at Aleppo, and author of a "Natural History" of that place, published in 1756 ; which was subsequently re-edited by his brother, the late worthy Dr. Patrick Ruffell, so well known by his works on the Plague, and on Indian Serpents. (See RUSSELL.) This original *Russelia* was neglected by Linnæus ; but in the *Supplementum*, printed in

in 1781, his son gave that appellation to another genus, now established under the name of *VAHLIA*, as will hereafter be shewn when we come to that article. The younger Linnæus appears to have puzzled himself between the words *Russelia* and *Roussia*; for the latter was what his father had intended; see *ROUSSEA*. The result of all this confusion is, that Jacquin's *Russelia* is now finally restored to its due rank.—Jacq. Amer. 178. Schreb. 419. Willd. Sp. Pl. v. 3. 344. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. Epit. 373. Juss. 118. Lamarck Illustr. t. 539.—Class and order, *Didymia Angiospermia*. Nat. Ord. *Personata*, Linn. *Scrophularia*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, ovate, concave, acute, taper-pointed, erect, small, permanent segments. *Cor.* of one petal, ringent; tube cylindrical, somewhat compressed, erect, several times longer than the calyx, hairy at the lower side internally; limb two-lipped; the upper lip roundish, flat, cloven, spreading, reflexed at the summit; lower rather the longest, in three deep, oblong, obtuse, flat, widely spreading segments. *Stam.* Filaments four, thread-shaped, erect, rather shorter than the tube, two of them longest; anthers ovate. *Pist.* Germen superior, ovate; style thread-shaped, erect, the length of the shorter stamens; stigma globose, undivided. *Peric.* Capsule roundish, beaked with the permanent base of the style, of two cells and two valves, about as long as the calyx. *Seeds* numerous, minute.

Eff. Ch. Calyx in five deep taper-pointed segments. Upper lip of the corolla emarginate; lower in three deep segments; tube much longer than the calyx, hairy within. Stigma globose. Capsule of two cells, and two valves, with many small seeds.

1. *R. sarmentosa*. Trailing *Russelia*. Jacq. Amer. 178. t. 113. Willd. n. 1.—Leaves ovate, nearly sessile. Stalks axillary, three-flowered. Gathered by Jacquin in woods and bushy places about the Havannah. The stem is shrubby, with numerous long, weak, square, smooth, leafy branches, supporting themselves against the neighbouring bushes, and pendulous at the ends. Leaves opposite, on very short stalks, ovate, acute, serrated; rather hairy on the margin and upper surface; smooth at the back. Flowers about an inch long, inodorous, of a fine red, growing two or three together on axillary stalks, not so long as the leaves. The partitions of the capsule, being formed of the inflexed valves, probably separate from the central column as the fruit ripens, and led Jacquin to describe the capsule as of one cell. The same thing is observable in *Verbascum*.

2. *R. rotundifolia*. Round-leaved *Russelia*. Cavan. Ic. v. 5. 9. t. 415.—Leaves sessile, heart-shaped, roundish. Clusters many-flowered, axillary and terminal, in pairs. Gathered by Louis Née, near Acapulco, flowering and seeding in February, March, and April. The stem is erect, shrubby, four feet high, with obscurely quadrangular, downy branches. Leaves about two inches in diameter, almost orbicular, though somewhat pointed, reticulated with veins, downy, especially when young, broadly serrated. Flowers scarlet, smaller than the preceding, in twin clusters, with small bractæas under each pair of partial stalks. Central column of the capsule hairy. Seeds minute, black. Cavan.

3. *R. multiflora*. Many-flowered *Russelia*. Sims in Curt. Mag. t. 1528.—Leaves ovate, pointed, stalked. Cluster terminal, whorled, compound; the stalks cymose. Found by Mr. Cowan, in the mountainous tract of South America, between Vera Cruz and Mexico. Mr. Lambert raised the plant from seed, and it flowered in his stove at Boyton in the autumn of 1812. The stems and branches are

weak and trailing, as in the first species; but the leaves are larger, and the flowers much more numerous, composing dense whorled clusters at the ends of each branch. Corolla scarlet, about the size of *R. sarmentosa*, but the points of the calyx are longer.

RUSSELL, Lord WILLIAM, in *Biography*, a distinguished patriot and martyr to the cause of liberty, was the third son of William, the first duke of Bedford, by a daughter of the earl of Somerset. He was born about the year 1641, and was brought up in those principles of liberty of which his father was an assertor, and which are congenial to the spirit of the English constitution. Being in the fervour of youth at the time of the restoration of Charles II. he joined in the gaieties of the court; till his marriage in 1667, with Rachel, second daughter and co-heiress of the earl of Southampton, reclaimed him from any irregularities into which he had fallen, and from this time he bore a most unblemished character. In four parliaments he represented the county of Bedford, highly esteemed for his patriotism and independent spirit. He was looked up to as one of the heads of the Whig party.

“A political intrigue of this period,” says one of his lordship’s biographers, “has brought an imputation on his memory, from which different methods have been taken to clear it. Charles II., one of the most profligate of public characters, had been exasperated against the court of France, by the withdrawing, on account of the marriage of the duke of York’s daughter to the prince of Orange, that pension which he had hitherto been mean enough to receive, and he appeared desirous of joining the continental confederacy against Lewis XIV. A French war being always popular in England, the parliament voted a large supply of men and money for the purpose. The patriots, however, knowing that Charles was not to be trusted, and being at the same time full of alarms respecting popery and arbitrary power, were very unwilling to give him the disposal of an army, which might as probably be employed against the liberties of the country, as against France. In this point, therefore, their wishes coincided with those of Lewis, in raising an opposition to the measures of the English court: and by means of a M. de Rouvigny, who was a relation of lady Russell, they intrigued with Barillon, the French ambassador in England. From that minister’s private dispatches, sir John Dalrymple copied, and published in his ‘Memoirs of Great Britain,’ his negotiations on this head, and also a list of members of parliament whom he had actually bribed.” Lord W. Russell is not charged with being one of the number bribed; he and lord Hollis, it is asserted, positively refused to accept of money. There seems, however, little reason to doubt that he took a part in the intrigue. His intentions, no doubt, were perfectly upright: he was zealously inclined to defend the Protestant interest, which he saw was in imminent danger, and he hoped, by the course which was now taken, the blow might be warded off. To his good intentions, therefore, his biographers must appeal for the justification of a step confessedly of a suspicious nature, and not consistent with correct policy.

In the year 1679, the king found it expedient to ingratiate himself with the Whigs, by the appointment of a new privy council, of which lord Shaftesbury was president, and lord William Russell was a member. They soon found that they did not enjoy the king’s confidence, who engaged in some important measures without their concurrence, among which was the recall of the duke of York; several of them resigned, and lord Russell among the number. His sense of the danger to the Protestant religion from a Catholic successor,

induced him to take a most decisive part in the attempt for the exclusion of the duke of York. He went publicly to Westminster-hall, and at the court of king's bench presented the duke as a recusant: this was in June 1680, and in the following November, he carried up the Exclusion-bill to the house of lords, at the head of 200 members of the house of commons. The lead which he took in this matter, as it was highly displeasing to the court, so it carried a great influence with the public, he being a person of high reputation for integrity, a man of very great fortune, and wholly destitute of private ambition. The king dissolved the parliament, and seemed determined to govern without one. Arbitrary principles were openly avowed by the friends of the king, and the cause of liberty, civil and religious, was brought into the greatest hazard.

This state of affairs inspired desperate councils into some of the Whig leaders, and a conspiracy was formed for an insurrection, conducted by a council, consisting of the duke of Monmouth, lords Russell, Essex, and Howard, Algernon Sydney, and Hampden, who were to act in concert with the duke of Argyle, and the Scotch malcontents. Among these leaders different designs prevailed; but it is admitted, that the subject of this article had no other views than to procure the exclusion of the duke of York from the throne, and a redress of grievances. While these schemes were agitating, a minor plot was laid by some inferior conspirators, which consisted of a plan for assassinating the king on his return from Newmarket, at a farm called the Rye-house, and which has given name to this plot. Although it is known that this conspiracy was entirely apart from the scheme of an insurrection, yet two of the persons engaged in the Rye-house plot had access to some of the leaders in the other plan, and the detection of the one plot, led to the discovery of the other, and orders were instantly issued for the apprehension of those engaged in it. Lord William Russell was in consequence committed to the Tower, and after some of the Rye-house conspirators had been condemned and executed, and the nation was fully impressed with horror of a plot supposed to be connected throughout with a design of assassination, he was brought to trial in July 1683. A jury of zealous royalists was packed for the purpose of convicting the prisoner: in the indictment, the noble lord was charged with the treasonable purpose of killing the king, which was made an inference from his being engaged in a plan of insurrection. "On the whole," says Hume, "having described the nature of the evidence produced on the trial, it was undoubtedly proved, that the insurrection had been deliberated on by the prisoner, and fully resolved; the surprisal of the guards deliberated on, but not fully resolved, and that an assassination had not been once mentioned or imagined by him. So far the matter of fact seems certain: but still, with regard to the law, there remained a difficulty, and that an important one. The English laws of treason, both in the manner of defining that crime, and in the proof required, are the mildest and most indulgent, and consequently the most equitable, that are any where to be found. The two chief species of treason contained in the statute of Edw. III. are the compassing and intending of the king's death, and the actually laying of war against him; and by the law of Mary, the crime must be proved by the concurring testimony of two witnesses, to some overt act, tending to these purposes. But the lawyers, partly desirous of paying court to the sovereign, partly convinced of ill consequences which might attend such narrow limitations, had introduced a greater latitude, both in the proof and definition of the crime. It was not required that the two witnesses

should testify the same precise overt act. It was sufficient that they both testified some overt act of the same treason; and though this evasion may seem a subtilty, it had long prevailed in the courts of judicature, and had at last been solemnly fixed by parliament at the trial of lord Strafford. The lawyers had used the same freedom with the law of Edward III. They had observed, that, by that statute, if a man should enter into a conspiracy for a rebellion, should even fix a correspondence with foreign powers for that purpose, should provide arms and money, yet, if he were detected, and no rebellion ensued, he could not be tried for treason. To prevent this inconvenience, which it had been better to remedy by a new law, they had commonly laid their indictment for intending the death of the king, and produced the intention of rebellion as a proof of that other intention. But though this form of indictment and trial was very frequent, and many persons had been convicted and executed upon it, it was unquestionably irregular, and plainly confounded, by a sophism, two species of treason, which the statute not only had distinguished, but meant accurately to distinguish. What made this refinement more exceptionable was, that a law had passed soon after the Restoration; in which the consulting or the intending of a rebellion was, during Charles's life-time, declared treason, and it was required, that the prosecution should be commenced within six months after the crime was committed. Lord Russell's crime fell within the statute of Charles II., but the facts sworn to by two witnesses, were beyond the six months required by law, and to the other facts there was only a single witness, and he an accomplice. Lord Russell perceived this irregularity, and desired to have the point argued by counsel. The chief justice told him, that could not be granted, unless he previously confessed the facts charged upon him." The artificial confounding of two species of treason, though a practice supported by many precedents, is the chief, but not the only, hardship of which the noble lord had to complain on his trial. His defence was feeble, contenting himself with protesting that he never had entertained any design against the life of the king. The jury, after a very short deliberation, found the prisoner guilty. Such a victim was too desirable to the court, and too agreeable to the vindictive feelings of the duke of York, for him to expect the royal mercy; and though his father, whose only son he now was, offered a large sum, a hundred thousand pounds, to the duchess of Portsmouth, for his life; and his excellent wife, the daughter of a most distinguished royalist, implored forgiveness in the most pathetic manner, his doom was irrevocable, and he obtained the remission only of the most ignominious part of the sentence. After his sentence, he was attended by Tillotson and Burnet, who, though afterwards favourers of the revolution, now urged upon the noble victim an acquiescence in the doctrine of non-resistance. This point, however, he was too firm and honest to concede, though a declaration to that purpose offered the only chance of a pardon. It was not quite creditable to the nobleness of his nature, that he should condescend, even to save his life, to write a petitionary and rather humiliating letter to the duke of York, promising to forbear all future opposition to him, should his life be spared. He also wrote a letter to the king, which was not to be delivered to him till after his death; this, though submissive, was not at all abject. It is almost certain he must have taken these steps in compliance with the solicitations of his friends, rather than from the desire of saving his own life; for he refused the generous offer of lord Cavendish to favour his escape, by changing

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clothes with him in prison; and he also declined the duke of Monmouth's proposal of surrendering himself, should lord William Russell think it might contribute to his safety. "It will be no advantage to me," he said, "to have my friends die with me." Conjugal affection was the feeling that clung closest to his heart; and when he had taken his last farewell of his wife, he said, "The bitterness of death is now over." He suffered the sentence of his judges with resignation and composure. Some of his expressions imply much good humour in this last extremity. The day before his execution he was seized with a bleeding at the nose: "I shall not now let blood to divert this distemper," said he to Burnet, who was present; "that will be done to-morrow." A little before the sheriffs conducted him to his carriage, that was to convey him to the scaffold, he wound up his watch, "Now I have done," said he, "with time, and henceforth must think solely of eternity."

The execution was performed July 21st, not on Tower-hill, the common place of execution for men of high rank, but in Lincoln's-Inn-Fields, in order that the citizens might be humbled by the spectacle of their once triumphant leader, carried in his coach through the city; a device which, like most others of the kind, produced an effect contrary to what was intended. The multitude imagined they beheld virtue and liberty sitting by his side. As he was the most popular among his own party, so was he the least obnoxious to the opposite faction; and his melancholy fate united every heart, sensible of humanity, in a tender compassion for him. Without the least change of countenance, he laid his head on the block, and at two strokes it was severed from his body. He was, at the time of his death, only 42 years of age. To his character for probity, sincerity, and private worth, even the enemies to his public principles bear testimony. Of his understanding, bishop Burnet says "that he was slow, and of little discourse, and had a true judgment, when he considered things at his own leisure." At Wooburn Abbey is preserved, in gold letters, the speech of lord Russell to the sheriffs, together with the paper delivered by his lordship to them at the place of execution.

Mr. Calamy, in speaking of lord Russell, says, "that an age would not repair the loss to the nation, and whose name should never be mentioned by Englishmen without singular respect." He passed through and left this world, with as great and general a reputation as any one of the age, and his memory will be had in grateful and everlasting remembrance. Honour and friendship attended lord Russell beyond the grave. Lord Cavendish married his eldest son to one of the daughters of his deceased, his murdered friend; for so the deed was described in the act of 1688-9, for reversing the attainder. The house of commons, at the same time, appointed a committee to examine who were the advisers and promoters of the murder of lord Russell. In May 1694 his father, the earl of Bedford, was created marquis of Tavistock and duke of Bedford; and the reasons for bestowing these honours upon him are in part as follow: "That this was not the least, that he was the father to lord Russell, the ornament of his age, whose great merits it was not enough to transmit by history to posterity, but they (the king and queen) were willing to record them in their royal patent, to remain in the family as a monument consecrated to his consummate virtue, whose name could never be forgotten, so long as men preserved any esteem for fancifulty of manners, greatness of mind, and a love to their country, constant even to death. Therefore, to solace his excellent father for so great a loss, to celebrate the memory of so noble a son, and to excite his worthy grandson, the

heir of such mighty hopes, more cheerfully to emulate and follow the example of his illustrious father, they entailed this high dignity upon the earl and his posterity."

RUSSELL, *Lady RACHEL*, the worthy wife of the subject of the foregoing article, distinguished herself equally by the affectionate zeal with which she served her husband, and by the magnanimity with which she bore her loss, and the reverence she cherished for his memory. Upon his trial, she accompanied him into court; and when he was refused a counsel, and permitted only to employ an amanuensis, she stood forth as that assistant, exciting the sympathy and admiration of all the spectators. After his death, she wrote an affecting letter to the king, asserting that the paper delivered by him to the sheriffs was of his own composition, and not dictated by any other person, as had been suspected. She was the faithful guardian of her husband's fame. A few days after the defeat and death of the duke of Monmouth, with whom lord Russell had an intimate connection, she made use of the opportunity for declaring her conviction that his grace's late attempt was a new project, and not at all depending on any former design, if there was any real one, which, she said, she was satisfied, was no more than her lord admitted, *viz.* talk; and it is possible that conversation might have proceeded so far as to consider, if a remedy for supposed evils might be sought, how it could be formed. "He had," continues her ladyship, "so just a soul, so firm, so good, that he could not warp from such principles that were so, unless misguided by his understanding, and that his own and not another's: for I dare say, as far as he could discern, he never went into any thing considerable upon the mere submission to any one's particular judgment." Lady Russell also, in the same affectionate regard to her lord's memory, after the revolution, made use of her interest in favour of his chaplain, Mr. Samuel Johnson, and was instrumental in procuring him a pension. As she had promised her lord to take care of her own life, for the sake of his children, she was religiously mindful in keeping her promise, and continued his widow to the end of her life, which did not happen till Michaelmas day 1723, at the age of 87. Biog. Brit. Hume. Letters of Lady Rachel Russell.

RUSSELL, ALEXANDER, a physician, who resided several years in the English factory at Aleppo, was a native of Edinburgh, and at an early period of his life was devoted by his father to the profession of medicine. His education was, of course, obtained in his native university; and on coming to London, he was induced to embark for Turkey, and settled at Aleppo, with the appointment of physician to the English factory there. He applied himself assiduously to the acquisition of the language of the country, and to form an acquaintance with the most experienced practitioners, in order to learn their modes of practice. But he soon obtained a proud pre-eminence above all the physicians there, and was consulted by all nations, ranks, and professions, by Franks, Greeks, Armenians, Jews, and even Turks themselves. The pacha of Aleppo particularly distinguished him by his friendship, and this intimacy enabled Dr. Russell to render the most important services to the factory. The pacha, indeed, did not fail to consult him respecting every act of importance; and many criminals, who were natives, owed their lives to the doctor's interposition. The pacha carried his esteem for Dr. Russell so far, that he sent some valuable presents to his aged father, saying to him, "I am obliged for your friendship and assistance."

In 1755 Dr. Russell published his "Natural History of Aleppo,"

Aleppo," a valuable and interesting work, containing especially some important observations relative to the plague, which have been found useful in Europe, and possibly have tended to check the progress of that dreadful scourge. This work has been translated into different European languages.

On his return to England, in 1759, he fixed his residence in the metropolis, and was elected physician to St. Thomas's hospital, a situation which he held to the time of his death, which occurred in 1770. The Royal Society were obliged to Dr. Russell for several valuable communications, and he presented many important papers to the Medical Society.

RUSSELL, PATRICK, brother of the preceding, and his successor as physician to the English factory at Aleppo. He published a copious "Treatise on the Plague," having had ample opportunities of treating that pestilential disease during the years 1760, 1761, and 1762. In this work, besides a journal of the progress, and a medical history of the plague, Dr. P. Russell has inserted a full discussion of the subjects of quarantine, lazarettoes, and of the police to be adopted in times of pestilence. He likewise published a new edition of his brother's "Natural History of Aleppo," upon a very enlarged scale.

RUSSELL, a mysterious character in London, about the middle of the last century. He was regarded as a parasite among people of fashion; seems to have been in Italy, sung in good taste, and composed some very elegant and pleasing English ballads: such as, "Can Love be controlled by Advice;" "At setting Day and rising Morn;" "Young Daphne, brightest Creature;" "If Truth can fix thy wavering Mind;" "Soft God of Sleep;" "Sweet were once the Joys I tasted;" "To curb our Will," &c.

RUSSELL, in *Geography*, a county of Virginia, bounded N. by Greenbriar, and S. by Lee county; containing 6816 inhabitants.—Also, a township in Hampshire county, Massachusetts; 15 miles W. of Springfield; incorporated in 1792, and containing 422 inhabitants.—Also, a township in the county of Leeds, Upper Canada, lying to the northward of Kitley.

RUSSELLÆ, ROSELLE, in *Ancient Geography*, a town of Italy, in Etruria, S.E. of Populonium and Vetulonii, situated on the right of Umbro, and at a small distance from it. It engaged with some other towns in succouring the Latins against the Romans, according to the report of Dionysius Halicarnassus. Pliny says, it became a Roman colony. Some vestiges of it appear at Roselle.

RUSSELLED, in *Rural Economy*, a term signifying withered or shrivelled, as an apple.

RUSSELSHEIM, in *Geography*, a town of Hesse-Dermstadt, on the Main; 6 miles E. of Mentz.

RUSSELVILLE, a town in Logan county, in the southern part of Kentucky, in a populous part of the state, about 40 miles from Nashville.

RUSSET, a country word for a dark brown colour.

RUSSEY, LE, in *Geography*, a town of France, in the department of the Doubs, and chief place of a canton, in the district of St. Hippolyte; 9 miles S. of it. The place contains 910, and the canton 5455 inhabitants, on a territory of 240 kilometres, in 22 communes.

RUSSGANGENUM, in *Natural History*, a name given by the people of the East Indies to a yellow and brass-like fossil substance, found in many places there; it resembles the marcasites, only that on trial it is found to contain very little sulphur: it is probably an ore of zinc.

RUSSI, in *Geography*, a town of Italy, in the department of the Amona; 8 miles N.E. of Faenza.

RUSSIA comprehends, in its most general acceptation, the whole Russian empire; but in a more limited sense, it properly includes those principalities and provinces, which for many past ages, *i. e.* for about 1300 or 1400 years, have been inhabited by Russians. In this latter sense its divisions are as follow: *viz.* 1. Great Russia, to which the name of Russia, in the strictest import, has been applied, and which comprises those large tracts of country, under different denominations, that have, without interruptions, composed the Russian dominion, such as Moscow, Vladimir, Novgorod, &c. &c. 2. Little Russia, comprehending the Ukraine, *i. e.* "the borders," or, in general, the three present governments of Kief, Tchernigof, and Novgorod-Sieverkoi; long separated from Russia, but again united to it in the year 1654. 3. White Russia, formerly denoting the present government of Smolensk, to which have been added the two governments of Polotsk and Mohilef, sometimes called the White Russian territory. 4. New Russia, denoting the large tracts of country near the Ukraine, towards Poland and the Turkish dominion, *viz.* New Servia and the province of St. Elizabeth, now belonging to the government of Ekaterinofslaf. But the Russian empire, in a more extended sense, includes not only the countries above-mentioned, but other regions, added to it by conquests and appropriations: such as, the kingdom of *Kazan*, the kingdom of *Astrakhan*, and the vast country of *Siberia*, which see respectively: the provinces on the shores of the Baltic, captured from the Swedes by Peter I. and for ever incorporated with the Russian empire by two treaties of peace, *viz.* Livonia, Esthonia, Finland, and Ingria, or the present governments of Riga, Revel, Vyborg, and St. Petersburg: the countries taken from Poland, now the governments of Polotsk and Mohilef, united to the empire by Catharine II.: the territory annexed by her to Russia in the peace concluded with the Turks in 1774: the Krim and the Cuban, or the province of Taurida and the government of Caucasus, united to the empire by that sovereign in 1783: the tributary islands in the eastern ocean, now added to Russia: the countries that have more recently submitted to the Russian supremacy, *viz.* Kartuelia or Kartalinia, &c.: the possessions in America, consisting partly of the islands, and partly of the continent of California, in which the principal establishment is called Donalesk: and some other countries, incorporated with the empire at various periods, as the Kirghis-Kozaks, of the middle and little horde, who submitted themselves in 1731, and several others. From this survey it appears, that the amplitude of the Russian empire is far greater than that of the largest monarchy in ancient or modern times. Of its extent the empress, in 1783. thus expresses herself: "The Russian empire is distinguished on the globe by the extent of its territory, which reaches from the eastern borders of Kamtchatka to beyond the river Duna, which falls into the Baltic at Riga, comprising within its limits 165 degrees of longitude; extending from the mouths of the rivers Volga, Kuban, Don, and Dnieper, which fall into the Caspian, the Palus Mæotis, and the Euxine, as far as the frozen ocean, over 32° of latitude." If we take into the account some islands, which the empress has not mentioned, the Russian empire, says Mr. Tooke, according to the newest and best charts, will be found to extend from about the 43d to the 78th degree of N. latitude, and from the 39th to the 215th degree of longitude, thus including the islands lying in the eastern ocean. Without reckoning the islands, the empire extends in length above 9200 English miles, and in breadth 2400. The writer now cited gives the following comparison between the Roman empire, at the

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the height of its grandeur, with that of Russia. The Roman empire contained about 1,600,000 square miles; or exactly as much as only the European part of Russia. Its greatest length, from the Euphrates to the western ocean, amounted to 3000 miles, and the greatest breadth, from the wall of Antoninus to the pillars of Hercules, 2000 miles; but if we take the length of the Russian empire, we shall find it to be, from Riga to Anadyrskoistrog, 9684 miles, and thence to the haven of Peter and Paul, in Kamtschatka, 1750 more. Moreover, the possessions of the Romans extended somewhat short of 32 degrees of latitude; whereas Russia comprises 35½. The Russian empire received a fresh augmentation at the treaty of peace concluded with the Porte the 29th of December 1791; that is, the whole territory of Ochakof or Otkhakov on the Bogue, as far as the Dniester, which last-mentioned river is now settled to be the boundary for ever.

Russia has various frontiers: on the N. and E., omitting the establishment on the continent of America, it is bounded by seas; on the other sides, its limits are partly terra firma, partly seas, and here and there rivers, viz. to the W. Denmark, Sweden, and the Baltic; to the S. Courland, Poland, Turkey, the Euxine and the Caspian, Persia, China, and various tribes of almost savage, nomadic, or uncivilized nations. Other frontiers are fixed by treaty; as, with Denmark, concerning Lapland and Finland, in 1602; with China and the Mongoles in 1727; with Persia in 1732, the river Terek being in some respects now regarded as the line of limitation; with Poland by various treaties, finally adjudged in 1795; with Sweden in 1721 and 1743; with the Turks by several treaties from 1739 to 1791; with Courland in 1783, which finally surrendered its independence in 1796. From Tchutzkaiä Zemlia, northwards over Kamtschatka, the empire borders very nearly on America; being, by the latest observations, only separated from it by a strait of the sea, called Behring's or Cook's straits, not more than 175 English miles in breadth.

With regard to climate and temperature, the Russian empire has been divided into three large regions, viz. the region lying above the 60th degree, and extending to the 78th degree of N. latitude; that lying between 50° and 60°; and that lying to the S. of 50° and reaching to 43°. The first is the rudest and coldest, and contains the greater part of the governments of Irkutsk, Tobolsk, and Vologda, the entire governments of Archangel, Olonetz, and Vyborg, with part of those of Perm, Novgorod, and St. Petersburg. The second region, with regard to fertility, may be called temperate; and it comprehends the governments of St. Petersburg, Revel, Riga, Polotsk, Mohulef, Smolensk, Pskove, Novgorod, Tver, Yaroslaf, Kostroma, Viätka, Permnia, Kolyvan, a good portion of Irkutsk and Ufa, the governments of Moscow, Vladimír, Nishnei-Novgorod, Kazan, Kaluga, Tula, Riazan, Voronetch, Tambof, Penza, Simbirsk, Kursk, Orel, Novgorod-Sieverstoi, Tchernigof, and the greater part of Kief, Kharkof, and Saratof. The third region is the hot climate, yielding products, e. g. wine and silk, which the two former do not: in this lie Taurida, Ekaterinofslaf, the greater part of Caucasia, and a part of Kief, Kharkof, Voronetch, Saratof, Kolyvan, and Irkutsk. Mr. Hermann divides the empire more accurately by its climates into four regions; the first is the very cold region, from 60° to 78° N. lat., including Vyborg, Olonetz, Archangel, the greater part of Irkutsk, Tobolsk, and Vologda, and a part of Perm, Novgorod, and St. Petersburg; the second being the cold region from 55° to 60° N. lat., comprehending Revel, Riga, Polotsk, Pskove, Tver, Moscow, Yaroslaf, Vladimir, Kostroma, Viätka, the greater

part of Perm and Kazan, and a part of Irkutsk, Kolyvan, Ufa, Simbirsk, Nishnei-Novgorod, Kaluga, and Smolensk: the third and moderate region extends from 50° to 55° N. lat. and includes Mohulef, Tchernigof, Orel, Kursk, Tula, Tambof, Penza, the greater part of Kief, Kharkof, Voronetch, Riazan, Saratof, Kaluga, Simbirsk, Ufa, Kolyvan, and a part of Irkutsk, Kazan, Nishnei-Novgorod, and Smolensk. The fourth or hot region reaches from 43° to 50° N. lat. and contains Taurida, Ekaterinofslaf, the greater part of Caucasia, and a part of Kief, Kharkof, Voronetch, Saratof, Ufa, Kolyvan, and Irkutsk. In many districts of the first region there is hardly any summer; the spring has in general much frost, snow, and rain; the winter is always severe. In the second region the summer is in many parts short, and yet in most of them so warm and the days so long, that the fruits of the earth usually come to perfect maturity, in a much shorter space of time than elsewhere; the winter too, particularly in the governments of Irkutsk, Tobolsk, Perm, Viätka, &c. is for the most part very severe. In the third region there are very extensive districts, e. g. in the governments of Irkutsk, Kolyvan, and Ufa, where the winter is also long and cold, which is chiefly owing to the lofty mountains with which they abound; but the governments in the European division of Russia, lying under this meridian, mostly enjoy a short and tolerably temperate winter, and a fine warm summer. In the fourth region the winter is short, the summer warm, often hot, and in many parts very dry.

The whole Russian territory consists at present of fifty alike-organized provinces, called governments or viceroalties. Each government is again divided into several circles; and some of the largest are farther distributed into districts. In each circle is a circle-town, where the circle-administration has its seat, and one of these circle-towns is at the same time the government-town, in which the governor-general and the principal officers reside, and by which the whole government is usually denominated. Besides these fifty governments, there are two more countries, having a military civil constitution, viz. the country of the Donskoy-Kozaks, and the country of the Euxine-Kozaks. (See COSSACKS.) The whole number of provinces is therefore fifty-two: and, moreover, the Georgian states Karduelia and Kakhetty, several petty districts in the parts of Caucasia, together with the country of the Kirghis-Kozaks, are to be reckoned among the countries under the protection and in the dependence of Russia.

History of the Russian Empire.—Although no other European empire has been so frequently and so well described in the three last centuries by foreign travellers as the Russian; yet neither did any other remain so long unknown to the civilized nations of our quarter of the globe. This fact may justly excite our surprize, if we consider, that so early as the thirteenth century, the adventurers and ambassadors, who either visited for private purposes, or were dispatched by their superiors to the courts and territories of the Tschingiskanides, partly took their route through Russia (for instance, Carpin and his attendants: see Voyage de Jean du Plan Carpin, chap. 1. in the Recueil de Bergeron): that in the same century the Hanse towns established numerous factories and a flourishing commerce, both at Novgorod and Plefco, and the Teutonic knights had founded a powerful state on the borders of Russia: that about the same period the Genoese, Venetians, and other Italian republics, occupied with colonies the coasts of the Euxine, and the rivers that flow into that sea, or at least navigated them, and from these colonies and coasts carried on an extensive trade with all the countries far and near: that even long before this, enter-

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prising Danes and Normanni, for the purposes either of traffic or depredation, explored the harbours of the White sea, and even the desert shores of the great northern ocean, abounding in costly furs: and that finally, Ivan the Threatening, and his son Vassilli Ivanovitch, waged frequent wars with the Poles, the Swedes, and the Teutonic knights, and had frequent correspondence by embassies, not only with their neighbours, but likewise with distant princes and populations. Whether the warriors, merchants, and artists who had a view of Russia, neglected to write down their observations, or their written remarks were never published; the fact is, that as far down as the commencement of the sixteenth century, the learned of Europe knew much less of Russia than we at present know of New Holland. It is likewise often difficult to discover from the earliest writers on Russia, when it was they wrote, or when their writings were first committed to the press; and though we should happily find out both the one and the other, we are not unfrequently at a loss, whether to arrange these ancient journalists and geographers according to the time when they wrote, or that in which their works were published.

The first particular accounts of Russia are found in the "Viaggio di Messer Jofafa Barbaro alla Tana," and in the "Viaggio del magnifico M. Ambrosio Contarini;" both in the second volume of the "Raccolta" of Ramusio. It is scarcely probable that these travels were printed earlier than the collection of Ramusio, since they are quoted by no author prior to the middle of the sixteenth century. Barbaro travelled in 1436, as a merchant alla Tana, or to the Crimea, and remained there sixteen years. He speaks only in the two last chapters of Russia, and of the Tartarian countries which lay to the south and to the east of Russia; particularly of Citracaa, or Astrachan; and of Casan, which city he describes as the principal mart of the trade in furs, which in his opinion were brought thither from Zagatai and Moxia. Barbaro must have wrote his journey long after his return from the Crim, as he remarks that the Russians had conquered Casan and Novgorod. Contarini travelled, in 1483, in quality of ambassador from his republic, through Poland and the Ukraine to the court of Persia, and returned, in 1487, across the Caspian, by Astrachan, and through Russia proper. It is curious enough that he speaks of a *Rossia bassa* and *alta*, and of a *gran Rossia bianca*. Of Novgorod he says: "la qual confinava quali con la Francia, et con la Almagna alta."

A great part of the Russian empire was anciently inhabited towards the N.E. and N. by a people of Finnish origin, perhaps descended from the ancient Scythians. Towards the N.W. were tribes consisting of a motley race of Sauromates and Grecian colonists; and from them are descended the modern Lithuanians, Lettovians, Livonians, and Courlanders; as were also the ancient Prussians. The whole southern part of Russia, even to the Crimea or Crimea, was for some time inhabited by Goths; and between the Volga, the Don, and mount Caucasus, was a nation descended from the Medes, called Sauromates, that is, the northern Medes. In process of time, when barbarian nations issued in swarms from the E., and some of the different tribes of Goths had, since the middle of the third century, penetrated into the western regions of the Roman empire; some of the Sauromates were under the necessity of retiring farther towards the N. and the W. The same political constitution which is now prevalent, existed at that remote period. Each individual of the nation was either master or slave. The various tribes which occupied the country derived their appellation from some river, town, or district; and from the more modern Varagian Rossii, the Russians,

it is said, about the year 862, received their name. No country in the globe contains such a mixture and diversity of inhabitants: each distinct nation having its own language, in some cases debased and corrupted, and retaining, more or less, its own religion and manners; while the generality of the main stems bear in their bodily structure, and in the features of their faces, the distinctive impression of their descent, which neither time nor commixture with other nations has been able altogether to efface.

The aborigines of Russia were *Finns* and *Slavonians*, see each respectively. Of the Slavonians, who inhabited the country about the Dnieper and the Upper Don, some, oppressed by the Bulgarians, spread themselves farther northward on the Dnieper, and constructed Kiev, while another colony penetrated up the Volkhof, and laid the foundation of Novgorod. After a dark period of more than 100 years, the Slavonians appear again among the Finns, and at this time the Russian state received its origin from the Scandinavians or Northmanni. The Slavonian settlers, both on the Volkhof and the Dnieper, were oppressed by two hostile nations, *viz.* the Khazares from the Euxine, and the Varagians, Varingians, or Northmanni from the Baltic. (See *KHAZARES* and *VARAGIANS*.) In the ninth century, the Varagians conquered from the Russians, who were a kindred north-gothic people, first mentioned in the year 839, and belonging to the Varagian race, and of course originally Normans or Scandinavians, the modern districts of Revel, St. Petersburg, and Archangel, and subjected the Slavonians, Krivitsches, Tschudes, Vessenians and Merænes, various tribes, partly Slavonians and partly Finns, to a tribute. The Russians retired to Finland and Karelia; but at length the Slavonians, aided by the other tribes just mentioned, expelled the Varagians, and formed themselves at the lake Ilmen, near Novgorod, into a federative democratical republic. After experience of the imperfection of this constitution, and finding it productive of internal disturbances, the five united nations resolved to call in the Russians for the purpose of restoring tranquillity, and affording them protection; and with this view they voluntarily offered to resign the sovereignty to them. The Russian prince Rurik, with his brothers Sineus and Truvor, accepted the invitation. Rurik, having collected together all his people, came in the year 862 to the mouth of the Volkhof, and assumed the government of the newly erected state; which, from its first formation, consisted of six several tribes, *viz.* Slavonian, Finnish, and Varagian, extending over the regions of the present governments of Riga, Revel, Polotsk, Pfcove, Vyborg, St. Petersburg, Novgorod, Smolensk, Olonetz, Archangel, Vladimir, Yarossaf, Kostroma, and Vologda. Whilst the Varagians, under Rurik, composed the predominant part, the Slavonians and Russians were soon blended into one nation; and though the name of the latter was transferred to the whole nation, yet the Slavonian language and manners retained the superiority, that people being considered as the most prevalent, both with regard to number and civilization. Rurik, fixing his residence at Staraya Ladoga, assumed the title of grand-prince; and when both his brothers died childless, he reunited their territories with his own, and in the fourth year of his reign, removed his residence from Old Ladoga to Novgorod, which from that time became the capital of the Russian monarchy. Soon after the elevation and establishment of Rurik, the Slavonians on the Dnieper, being oppressed by the Khazares, besought Rurik to give them a prince of his own race; and he accordingly sent his step-son Oskold, who subdued the Khazares, and founded at Kiev the second Slavo-Russian dominion, dependent on the Novgorodian empire. Oleg, the immediate

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immediate successor of Rurik, united Kief with the Russian territory, and appointed this second Slavonian family seat to be his residence and the capital of the country. Under the following reigns, the power of the empire rapidly increased. Russian armies appeared before the gates of Constantinople; many nations were rendered tributary; the Russians carried on a regular commerce to the coasts of the Euxine; they built cities, and not only embellished but gave laws to such as already existed. On the death of Vladimir the Great, in the year 1015, who embraced the Christian religion, and introduced it into Russia, the progress of the nation was checked by the partition of its territory among his twelve sons. This was followed by a variety of sanguinary contentions, till at length there arose a third state, *viz.* White Russia, or Vladimir. Of these three states, *viz.* Vladimir, Kief, and Novgorod, the principal was Vladimir, and Suzdal was its capital. This distinction afterwards devolved on Vladimir; and finally on Moscow, a city which was founded in the year 1147, by George I. In the year 1237, the Mongoles and Tartars, who under their khan Tschingis had united themselves into a powerful state at the beginning of the 13th century, and subjected the greater part of Asia, put themselves under the conduct of his descendant Batu, khan of Kaptshak, and fell upon Southern Russia, where they founded a formal sovereignty. The Tartars, having effected their conquest, numbered the people in the principalities, imposed on them a heavy tribute, and thus riveted the oppressive yoke of foreign sovereignty which the Russians endured for upwards of 200 years.

Whoever has studied the Russian history with attention, must naturally be surprized that the nation, in consequence of the numerous and formidable revolutions which it underwent, was not utterly demolished or dispersed, their dominion entirely subverted, and their very name, as has been the case with so many other nations, totally effaced. The Russian nation, however, not only weathered out all the storms, which so frequently menaced its dissolution, but rose, as if refreshed with juvenile vigour, extended its gigantic arms on every side, vanquished all its hostile neighbours, and at a very early period of its greatness crossed the mountains, which for immemorial ages had been styled by their inhabitants the girdle of the globe, and there, as in a new world, progressively made conquests, no less for geography and natural history, than for their immense domain.

In 1462, Ivan Vassilievitch I. ascended the throne of Moscow, and after a reign of fourteen years, refused obedience to the Tartars, and by a series of victories, gained possession of the Tartarian kingdom of Kazan, and reduced its sovereign to a state of tributary vassalage. In 1477, the republic of Novgorod submitted to the force of his arms, and a similar fate befel the principalities of Pskov and Tver. Lithuania lost a considerable part of its territory. The princes of Severia voluntarily surrendered; and the increasing power of Ivan was withstood only by the Teutonic order in Livonia. Under his successor Kazan was lost for a short time; but Smolensk was incorporated into the Russian state. Ivan Vassilievitch II. at length burst the last shackles of the Mongole-Tartarian sovereignty. The entire conquest of Kazan was completed in seven years, the capital of the kingdom surrendering in 1552. Two years afterwards, Astrachan became a Russian province: and Ivan advanced into Caucasus, and subdued the whole Kabardey. Although the Ottoman Turks, aided by the Tartars of the Krim, ravaged the capital of Russia, this disaster was amply counterbalanced by the channel opened for maritime commerce by way of Archangel, and by the conquest of Siberia, events which date their commencement from the reign

of Ivan, but which owed their completion to his successors. As others state these events, Ivan III., surnamed the Threatening, was the first who, towards the latter end of the fifteenth century, began to demolish this baneful oligarchy, and to throw off the yoke of the Tartars. The most considerable annexation he procured to his empire consisted in the reduction of Novgorod, and the northern provinces, which ages ago had been conquered by the Novgorodians, and retained under their dominion. His son and his grandson Vassillie Ivanovitch and Ivan Vassillievitch the Terrible, completed the grand project, which the father and grandfather had left for their successors. Under the reign of Vassillie Ivanovitch, baron Herberstein laid down the first perspicuous geography of the Russian empire, according to which we shall describe the boundaries of it towards the latter end of the fifteenth, and the commencement of the sixteenth centuries.

Herberstein uses the term Russia in a two-fold acceptance. By the one he understands all those countries that were inhabited by Russians; and in this larger sense he even comprehends the king of Poland and the grand duke of Lithuania among the Russian princes, since both of them possessed territories that were occupied by Russians. In the more contracted import, that author comprises simply the countries subject to the grand prince of Moscow. In the description of this proper Russia, taking his departure from Moscow, he first mentions the eastern and southern, and then the western and northern provinces.

Eastward, therefore, of the province of Moscow, the grand prince of Russia possessed the provinces of Vladimir, Nishnei-Novgorod, and Riazan; the river Sura forming the boundary between the Russian and Casanian territories. (Sura fluvius Mosci, et Casanensis regis dominium dividit, page 65.) Towards the south-east, during the reign of Ivan III. the Russian confines reached only about a day's journey from the city of Riazan; for Contarini arrived at the city Riazan the day after he entered the Russian territory. (Ramus. ii. 122. fol. b.) To the south, Tula was the last Russian city towards the Tartarian steppes (Herberst. p. 66. Tulla—est ultimum oppidum ad campestria deserta); and somewhat farther to the west was Kaluga, the fortified city, where the grand prince annually assembled his troops against the incursions of the Crimean Tartars. (Ibid. p. 68.) Towards the south-west, Vassillie Ivanovitch first conquered the principality of Novgorod Sieverskoi, which at that time comprehended also Tchernigof, and a part of the present government of Orel. (Ibid. 68—70.) Towards the west, Smolensk, which province Vassillie Ivanovitch, in 1514, severed from Poland or Lithuania, Pskov, and a part of the present Petersburg government, to the mouth of the Narova, formed the boundary. To the north of Moscow lay, lastly, the provinces Tver, Great Novgorod, Yaroslaf, Kostroma, and the provinces formerly subject to the Novgorodians, namely, Vologda, Ustiug, Viatka, Perm, and Dvina.

Reckoning the principalities specified by Herberstein to the division of the governments and viceroalties made by Catharine II. then the empire subject to the grand prince Vassillie Ivanovitch, excepting Moscow and a part of the Petersburg government, comprised only those of Pskov, Tver, Novgorod, Archangel, Vologda, Yaroslaf, Kostroma, Viatka, Perm, Smolensk, Tchernigof, Novgorod Sieverskoi, Orel, Kaluga, Tula, Riazan, Vladimir, and Nishnei-Novgorod. Short of the present number of viceroalties by those of Petersburg almost entirely, then those of Viborg, Revel, Riga, Olonetz, at least in part, Tobolsk, Pclotsk, Mohilef, Kharkof, Kursk,

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Kursk, Kazan, Simbirsk, Penza, Tambow, Voronetz, Saratof, Ufa, Kolyvan, Irkutsk, Minfk, Iftaf, Brazlau, Kief, Ekaterinofsk, Caucasus, and Taurida, together with the country of the Don Cossacks, and the provinces which fell to Russia on the last partition of Poland.

Ivan the Terrible continued the aggrandizement of the empire, of which his father and grandfather had laid the foundation, with equal zeal and success. He conquered, in 1552 and 1554, Kazan and Astrachan, and united the countries dependent on those cities for ever with his empire. It was during his reign that a band of Don Cossacks, whom he had driven as robbers from the inferior Volga, forced their passage across the Uralian mountains, overturned the dominion of the Tartars on the Tobol and Irtisch, and, unknown to the grand prince, conquered the north-western districts of Siberia to the last-mentioned river. Though it cannot be said that the Russian tzars had neglected to make conquests in the northern Asia; it may, nevertheless, be affirmed, in a certain sense, that the conquest of Siberia was completed of itself in nearly the same manner in which it was begun. The court of Moscow undoubtedly listened with encouraging attention to the advantageous proposals that were made respecting the extension and fortification of the Siberian districts, and royally rewarded the persons who, by their prudence and bravery, had deserved so well of the empire. The czar sent, or at least agreed to the reinforcements that were wanted for the farther prosecution, or the defence of the acquisitions, now that they were made. These reinforcements were, however, generally so small, that in Moscow, much less abroad, they were scarcely remarked. The hopes of obtaining riches either by a fortunate chase, or by extortions practised on the unarmed tribes that were found inhabiting the steppes and wilds of Siberia, annually allured thousands of bold hunters and warriors into those parts; and these adventurers, spurred on by their insatiable avarice and unbounded licentiousness, were perpetually exploring new regions and populations, which were not yet exhausted and plundered of their all. Thus it happened, that about a century after Yermak had destroyed the empire of the Tartars upon the Irtisch, almost the whole of that prodigious tract of country was subdued at a far less expence of blood and treasure than the smallest of the western and northern provinces which had hitherto been conquered had cost, or, as was afterwards seen, those which then remained to be subdued.

Feodor, the son and immediate successor of Ivan the Terrible, abandoned his claim to Esthonia, and in return forced from Sweden in 1594, the cession of Ingria and Karelia. By Feodor's death, in 1598, the dynasty of Rurik became extinct; and during the subsequent interregnum, many pretenders, under the name of Demetrius, involved the empire in confusion, till, in 1613, Mikhaïla Romanof, or Michael Feodorowitz, of the dynasty of Romanow, descended in the female line from Ivan IV. was elected sovereign, and by large sacrifices purchased the repose of his empire. To the Swedes he was obliged to relinquish Ingria and Karelia, and to the Poles, Smolensk, Severia, and Tchernigof, and to make a formal renunciation of all claims upon Livonia, Esthonia, and Courland. From that period to the present day, Russia has not only been gaining its ancient possessions, but so far extending and enlarging them, that the present circumference of the empire has no parallel in the history of the world. Alexey, or Alexis, the son and successor of Michael, not only reconquered the countries ceded by his father to the Poles, but also reduced Kief and the Ukraine on the E. side of

the Dnieper, in 1655, to a re-union with the parent state of the Slavo-Russian nation. His son, Peter I., "the creator of modern Russia," acquired to his empire in 1721, by a twenty years' war with Sweden, the provinces on the shores of the Baltic, which had occasioned bloody contentions among the northern powers for many centuries: Livonia, Esthonia, Ingria, and a part of Kexholm and Karelia, were subjected to the Russian sceptre, thus adding to the Russian empire great advantages for commerce, and a respectable rank among the principal European powers. Catharine II. aggrandized Russia both within and without, by a reform of its government, and by several successful wars. She obtained from the Porte, in 1774, the possession of the city of Azof, with its territory; and for the security of the Russian navigation on the Euxine, the forts of Kinburn, Kertsch, and Yenicaly in the peninsula of the Crimea. In 1783 the whole province became, by treaty, a Russian government; and recovered its ancient name of the Tauridan Chersonese. Russia also, by the same convention, enlarged her borders to the south by the Kuban, where at present the Caucasian mountains form the boundary of the Russian dominion. Afterwards the Porte was compelled to surrender a considerable tract of country on the shores of the Euxine, between the Bogue and the Dnieper. In the disgraceful partition of Poland, Catharine obtained for her share, in 1773, the four Lithuanian voivodeships of Smolensk, Vitepsk, Mstislaf, and Polish Livonia, with a part of the voivodeships of Polotsk and Minfk. An unprosperous war terminated in 1793, with the loss of the fertile provinces of the Lesser Poland and Lithuania; and at length the capital of the kingdom fell into the hands of the Russians; its political existence was annihilated, and in 1796 the last vestiges of it were lost in the confines of the bordering states. One consequence of the annihilation of Poland was the acquisition of the duchies of Courland and Semigallia, including the circle of Pilten, which, on the dissolution of their feudal connection with the republic, by a resolution of the states of the country, submitted themselves unconditionally in 1795 to the sceptre of the empress.

Catharine extended her territory, by the mild authority of her laws, and the methods of civilization which she adopted, as well as by her conquests and treaties. Accordingly the czar of Kartuelia and Kakhetty put himself under the protection of the Russian empire, by acknowledging, in 1783, the supremacy of its monarch. She also invited people from all countries to settle in her dominions, and thus established numerous colonies. She reduced a multitude of tributary nations dwelling in the interior of Siberia to submit to her laws. She set on foot and encouraged several voyages of discovery, which obtained for the Russian empire a new sovereignty in the eastern ocean, and on the western coast of America.

The brilliant conquests of Catharine may, indeed, immortalize her fame as a conqueror; but they alone will never render the memory of that accomplished and sagacious monarch beloved and blessed. Cordial affection and admiration are the proper tribute both of contemporaries and posterity, due only to her as the wise and benign legislatrix, instructress, and patroness of her numerous populations and countries. Thousands of persons, to whose judgment even upright and excellent sovereigns cannot be indifferent, lament at present, and will lament to latest ages, that the emotions of affection and admiration, so congenial to the heart with which the exalted legislatrix, instructress, and patroness of the nations obedient to the Russian sceptre has inspired, and ever will inspire them, are painfully disturbed

turbed and abated, either by the recollection of the blood which one half of her conquests cost, or the maxims that were followed in obtaining possession of the other.

Researches respecting the extent and dimensions of countries would be of far greater value than can at present be allowed them, if the internal strength of empires increased in equal ratio with their extension, or the real happiness of their inhabitants with both. Russia affords the most convincing proof that this is not the case. No European nation ever ruled over countries of such vast extent as the Russian; and yet there have been, and still are in Europe, several nations exceeding the Russian in population, or at least in power and well-being. The statements of the magnitude of the Russian empire lose greatly of their interest by differing so widely from each other. Le Clerc gives to the Russian empire a superficial content of 949,375 leagues, and censures the historian l'Évêque for having erred in his statement by at least 424,375 leagues. The German geographers have not so great a discrepancy in their account as the French. In the mean time, between those who set it down at the least, and those who assign to it the greatest number, there is a prodigious interval, an interval which Germany and France together could not fill up. We mean France before the revolution. Three hundred thousand square geographic miles compose the least, three hundred and thirty thousand the greatest extension which German authors have assigned to the Russian empire.

Of those tribes called Kozaks or Cossacks, which are of Russian origin, we have given a brief account under the article COSSACKS. Of the three Slavonian nations, properly so called, that are inhabitants of the Russian empire, next to the principal nation, the Poles are the most numerous. These, it is said, at the same time with the Russian Slavi, and on the same occasion, came from the Danube to the Vistula. Their state, now nearly extinct, was probably founded in the ninth century; and they sprung from the same stock with the Russians. According to the present state of the Russian empire, the Poles form a very considerable part of the aggregate population. They may be found, in an immense multitude, in the governments of Polotsk, Mohilef, Minsk, Brazlau, Vofnesensk, Podolia, Volhynia, Vilna, and Slonimsk; and in smaller numbers, as colonists, in the circle of Selenghinsk, on the Irtysh, and in various other parts of the empire. The third Slavonian nation within the borders of Russia is composed of the people called *Servians* or *Serbes*. (See SERVIAN.) Besides those tribes which we have already enumerated, there are two others in the Russian empire, who are supposed to be related to the Slavi: these are the Lithuanians and the Lettish. (See LITHUANIA and LETTES.) For an account of the *Kalmucks*, *Mandschures*, *Mongoles*, and *Tartars*, as composing primitive stocks of the nations dwelling in Russia; see these several articles respectively. In the Russian empire there are also some nations whose origin is utterly uncertain. Mr. Tooke reduces them to two classes, one comprising the *Samoyedian*, and the other the eastern *Siberian* nations. (See SAMOYEDS and SIBERIA.) Of the European nations, some bodies of which are dispersed through the Russian empire, the most numerous are the German. In the governments of Riga, Revel, and Courland, they form the most considerable, though not the most numerous, part of the inhabitants. The Germans residing in the government of Riga amount, according to the latest enumeration, to 30,000, and those in that of Revel to 15,000; and in Courland they are thought to be still more numerous. In Moscow and St. Petersburg they live by thousands; in the latter alone they are known to be

upwards of 17,000. As colonists, properly so called, many thousand German families came, in 1763, into the governments of St. Petersburg, Saratof, Voronetch, and Tchernigof, as settlers, the number of whom, since the year 1783, is much increased by new settlements in the government of Ekaterinofslaf, and in the province of Taurida. All these, and the multitude of such as live separately about the empire, taken together, may, as Mr. Tooke suggests, probably far exceed 100,000. Of the other European nations, there are only detached colonies, especially in the large towns. In the governments of Vyborg and Revel, and in some of the islands of the Baltic, there are Swedes, but not amounting to a very considerable number. The islands Vorms and Rugen, in the Baltic, are partly inhabited by Danes, but they are most numerous in Moscow and St. Petersburg, and some of the large towns. In most of the sea-ports there are Englishmen, who make no long stay, but return to their native country as soon as their affairs permit. French and Italians are also dispersed over the whole empire. In Little Russia, at Neshin, in the government of Tchernigof, in that of Ekaterinofslaf, and in Taurida, the Greeks form some respectable colonies. In the government of Ekaterinofslaf there are also Albanians, Moldavians, Valakhians, and Arnauts, though their number is not great. The Ottoman Turks are, in a great degree, dispersed; but they are found together in small numbers at Orenburg, in the former Otchakof steppe, and in some other places. In the districts of Astrachan and Orenburg there are many Persians, and on the Kamma there is a colony of Persians and Arabs. The Armenians are numerous in the towns of Orenburg, Kitzliar, Mosdok, St. Petersburg, and Moscow; but in the governments of Caucasus and Ekaterinofslaf they compose a colony consisting of some thousands. The town Nachitschevan, on the Don, is almost wholly inhabited by them. In Astrachan and Kitzliar are settlements of Indians. The Jews are numerous in some of the provinces, particularly those of Poland, now annexed to the Russian empire, and in Taurida, where they are partly fixed as ancient inhabitants. Gypsies are found strolling in large companies in the provinces both of Great and Little Russia. Upon the whole, Mr. Tooke observes, that the inhabitants of the Russian empire form at least 80 distinct nations, differing essentially in lineage, and also in manners and language.

Climate, Weather, and natural Qualities of the Soil of Russia.—As to the soil as well as the climate, there is a great diversity in the different provinces of the Russian empire. Some tracts of land in Great and Little Russia, in the provinces bordering on the Baltic, and many others, are kept in constant cultivation and tillage. In other districts, *e. g.* in Little Russia, about the Don, &c. the land is only cultivated occasionally; and again in other parts of the empire, lands fit for agriculture are left wholly unemployed, for want of labourers. The quality of the soil is very different in different tracts; in Livonia and Esthonia, good fields yield 8, 10, and 12-fold, and, in some cases, 16, or more than 20-fold; but in different ground about 3. The harvests about the Don are commonly 10-fold; but towards Tomsk, on the Thumush, and in the whole region between the Oby and the Tom, many fields afford an increase of 25 to 30-fold; and at Krasnoiarik a crop has not been known to fail: of winter corn they reap 8, of barley 12, and of oats 20-fold. In Little Russia, on the Don, and in many other places, the soil is sufficiently fertile, without manure. This is also the case in a great part of Siberia, *e. g.* on the Samara; on the Ufa, in the country of the Bashkirs; here and there in the Baraba; and also on the Kamma, in the government of Irtysh; on the Oby near Barnaul, at Krasnoiarik, and on the Selenga.

All travellers agree in praising the salubrity of the atmosphere in Russia, and the absence or infrequency of several diseases with which the other countries of Europe are visited, arising from it. Herberstein and his followers, from the general healthiness of the Russian climate, have explained this remarkable fact: that, from time immemorial, the plague has never communicated itself from the sources of the Don to the north and east; which opinion, however, has been confuted, even in ancient times, by several dreadful pestilences, and likewise in the last century, by the formidable plague which, in 1770—1772, raged in the city and territory of Moscow. Since the districts of the Lower Don and Dnieper, and those between the Dnieper and the Dniester, have been incorporated with the Russian empire; the country of the Don Cossacks, and what was formerly called Polish Ukraine, form an exception to the justly boasted salubrity of the climate of European Russia. Almost every year thousands of persons are carried off by all kinds of ardent and putrid fevers, dysenteries, inflammations of the chest, pleuritis, &c. from July to the beginning of winter, especially in those parts which are surrounded with fetid morasses, or have no other than stagnant and putrescent water.

While, upon the whole, they extol the salubrity of the Russian climate, they, in general, complain of the intense cold of the winter, and the equally excessive heat of the summer, which, in the northern and central Russia, very often prove destructive to men and beasts, no less than to the fruits of the earth. Almost all travellers adduce the same allegations, or instances of the insufferable heats and frosts of the Russian empire. The winter, say Herberstein and his followers, lasts from six to eight months. During that season, all the rivers and lakes are covered with ell-thick ice, and the ground with ell-deep snow. Where the ground is not covered, it is rent in wide and deep chaps by the winter cold, as in the milder parts of Europe by long continued summer drought and heat. In the coldest days, on first going out of the warm apartments into the open air, the breath is taken away, or contracted almost to suffocation. Spittle ejected is converted into ice before it reaches the earth; and if we touch metal with moist hands, the skin is left adhesive to it, as though the metal were glowing hot, and the same sensation is experienced from the contact. With the utmost precaution it nevertheless frequently happens, that those who take only a short walk, in a few minutes have their nose, ears, or fingers frozen. Men and cattle bringing provisions to town are often frozen to death. Ravenous and other birds fall dead to the ground, and fruit-trees are riven by the piercing frost. It is affirmed by Gœteeris, pp. 88, 89, that it sometimes happens that flesh and fish, which have been boiling and roasting more than an hour, on being cut up on table, were still frozen within. The same author relates that the beards of himself and others were hard frozen to the bed-clothes while asleep. The greatest advantage arising from long and severe winters in Russia is this; that it levels all roads, and opens them in every direction, so that travelling from one place to another is incredibly rapid and cheap; therefore, even in ancient times, when many canals were not yet dug, many roads and bridges not constructed, and many swamps not drained, the winter, still more than at present, was the proper season for commerce and the transport of commodities. Whereas, no sooner has the vernal sun dissolved the incrustation of the waters and the land, but at once the rivers and streams overflow their banks, converting the lower plains and vallies into lakes or morasses. Within a few days after the snow has disappeared, the forests and trees are clothed with beautiful foliage, and the ploughed lands, meads, and pasture-grounds, with the most luxuriant corn and herbage,

which, owing to the humidity of the soil, and the rapidly increasing ardours, shoot upwards with an almost visible growth. The times of sowing and reaping, therefore, border on each other in Russia much nearer than in other European countries. Violent rains, boisterous winds, and continued fogs, are more frequent than thunder-storms, as immoderate, or late frosts, are oftener injurious than long droughts. Sometimes, however, Russia experiences such hot and dry summers, that fields of standing corn and forests take fire, so that entire provinces are filled with noxious smoke, and in some sort darkened by it. Among the principal annoyances of the hot seasons, are the innumerable swarms of musquitos, from which no rest is to be had night or day, and the cold nights that not unfrequently succeed to sultry days.

Russia being generally a level country, or at most only rising to moderate hills, it is somewhat curious that, though destitute of mountains, it contains more forests, lakes, and rivers, more brooks and running springs, than any other territory in Europe.

The north-eastern provinces, from the Volga to the Ural, are described by former travellers as a country for the most part covered with inexorable forests, and that even where it is cultivated, it strikes the eye as having been not very long since clothed with wood. Herberstein, p. 61, speaks thus even of the province of Moscow: "Totam porro regionem non ita diu admodum sylvosam fuisse, ex magnis arborum truncis, qui etiamnum extant, apparet." "Il est vrai," says Miège, "qu'il est tellement plein de forêts, que dans l'espace de 500 lieux, que nous fimes à travers ce pays là, nous en eumes toujours en vue, quoique ce fut la partie la mieux peuplée du pays." Russia is, even at present, far more woody than any other European countries. The Volchonskoi forest, through which the road lies from Viasma to Moscow, extends on all sides to unknown distances; and in this forest it is said, that, even in the last century, numerous colonies were discovered, which, from their origin, had been utterly unknown, not only to the government, but even to the nearest inhabitants. Of such colonies several may probably still exist in the prodigious forests with which the districts of Olonetz, Archangel, Perm, and other northern districts are covered. Even the road between Moscow and Peterburg runs mostly through an uninterrupted succession of woodland, in which villages are rarely seen. The forests of Russia consist chiefly of cedars, pines, firs, linden, and birch; and the shores of the Volga, the Occa, the Don and its tributary rivers, are adorned with vast forests of oak, from which the ship-timber is conveyed to the ports of the Baltic, and to the wharfs of the Don and the Euxine. The regions between the inferior Volga, between the Don and Dnieper and Dniester, have fewer or even no woods at all, and the inhabitants are obliged, in many places, to dress their victuals with dried cow-dung.

It would be in vain to attempt at particularizing the lakes, pools, and marshes, the rivers, brooks, and springs which are said by the ancient travellers to be innumerable even to the inhabitants themselves. Those who came from Poland, or Livonia, represent travelling through Russia as extremely perilous, not only on account of wolves and robbers, but from the badness of the roads, and the miserable state of the bridges. When people of quality were going a journey, orders were previously sent to the country-folks of the parts adjacent, to make the roads and bridges in some degree passable. The high roads are now, in many parts of Russia, as fine as in other European countries. If the wooden bridges are in some places badly maintained, and from the defect of here or there a balk are inconvenient and troublesome to the traveller; they do not, however, so often endanger his neck. The roads are at least sufficiently wide, and every where provided

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vided with vest-potts. See Coxe's Travels, vol. i. where the road between Petersburg and Moscow is described.

Those who have gone from Archangel up the Dwina and the Yug by ship, and then generally in sledges from Vologda to Moscow, unanimously affirm, that nowhere is more convenient and pleasant travelling than in Russia; the eye being incessantly delighted by the alternation of magnificent forests, rich pastures and corn-fields, but principally by the inexhaustible abundance of running waters. (Fletcher, pp. 414, 415.) This latter commendation is, however, more fitly applicable to the northern than to the midland and southern parts of Russia, since in these the rivers have a slow current, and in summer are nearly stagnant; so that from Moscow quite to the Crimea scarcely any other than bad or indifferent spring-water is found. Suyef, p. 7.

On no topic are travellers more agreed, than in extolling the fertility of most of the Russian provinces. The soil, they inform us, consists generally of a black, fat mould, which produces all kinds of corn and grain, orchard fruits and garden vegetables, as also hemp and flax, in the greatest abundance; and, in many places, even without needing manure. The meadows and pasture-grounds feed incredible droves and herds both of large and small cattle: the forests are the haunts of an unspeakable quantity of not only the choicest species of game, but likewise of such animals as yield furs, which are every where eagerly sought after: the lakes, ponds, rivers, and brooks, in short, nourish a far greater variety of the most delicious kinds of fish, than all the other countries of our quarter of the globe taken together.

With respect to fertility of soil, the preference is generally given to the province of Vladimir, or somewhat rather, perhaps, to that of Riazan. The soil is, in the former of these provinces, of such fecundity, that not unfrequently from one bushel of sowing a produce of from twenty to thirty bushels is obtained. Still more prolific is the province of Riazan; where, according to report, very often one single grain of wheat will shoot out two or more straws, and they so thick and strongly grown together, that a horse cannot easily break his way through, and growse can with difficulty rise from among them. These provinces likewise produce honey, wax, fish, fowl, and all sorts of game, in the greatest profusion, and of the best quality; even the human inhabitants of them are bolder and more warlike than other Russians. If any one should think proper to put the Ukraine and the country of the Don Cossacks in competition with these two provinces, we have only to allege against it, that, indeed, in many parts of the Ukraine no manure at all is used; because if it were, it would either burn up the farina fecundans of the seed, or only produce enormous straws and foliage, destitute of ears and fruits. The stalks of the Ukraine corn are so tall and thick, that they are more like reed-stems than corn-straws.

Honey and wax are sought for in hollow trees, where the wild bees deposit their treasures, or in trunks of trees excavated for the purpose of serving as hives, which the boors fence with wires, to preserve them from the depredations of the bears. Several authors repeat the story, which Jovius heard of the ambassador Demetrius; that a boor once looking for honey in the forest, fell up to the neck in a hoard of it in a large hollow tree, whence, after passing a couple of days in that sweet situation, he was extricated at last by catching hold of the hind legs of a huge bear.

No country of Europe abounds so much as Russia in fish and game, particularly in the choicest wild-fowl, viz. the woodcock, the heath-cock, the pheasant, the partridge, the bustard, the snipe, &c. Cavear was already a principal article of commerce in the 16th century, and was exported by the French, Dutch, and English to Italy and France, having

been first brought hither by Capt. Chancellor, in the reign of queen Elizabeth. It is mentioned by Shakspeare in his Hamlet: "Cavear to the multitude." But we must break off. To enter into details of wild and tame animals, of mines and metals, of edible roots and vegetables, of orchard fruits, of flowers and grasses, of wild herbs and berries, of the cheapness of the several necessaries of life, and the gradual increase of their prices, would swell this article beyond all proper bounds. We must, therefore, content ourselves with referring the reader for these and other particulars to the travellers who have given their observations to the public; such as Herberstein, Jovius, Olearius, Petreius, Margaret, Dr. Fletcher, Muller, the two Gmelins, Le Bruyn, Gæteeris, Cook, Korb, Tanner, Kupel, Herrmann, Hamard, Guagnino, Coxe, and more especially our inquisitive and laborious countryman Mr. Tooke; who have all treated not only of the climate, but also of the soil and produce.

It is easily conceivable, that in a country of such vast extent as Russia the climate must be extremely various, and this difference may even be reckoned, in some respects, among its advantages. In several provinces the winter is of long duration, and extremely cold; the short summer is, however, on that account, the hotter. And in these regions, for instance about Kolmogor, Archangel, several districts of Siberia, &c. the alternations of cold and heat are uncommonly rapid and frequent. The agreeable introduction to summer and winter, which we call spring and autumn, is here scarcely known. Amidst the burning heats of summer in these parts, you have frequently to contend with piercing cold. A simple change of the wind is able to produce this sudden alteration. In a place not quite 60° N. lat. it frequently happens that, after a sultry day, towards evening, if the wind veers to the north, such a cold ensues as to render a fur cloak not inconvenient. The formidable severity of the frost makes it necessary to adopt the practice of caulking the windows and covering the outside of the doors of the apartments with a felt made of cow-hair, called by the Russians *voitsk*. To the same extremity of frost it is owing, that, in some parts of Russia, they have no orchard fruits.

In general the governments of Moscow, Nishnei-Novgorod, and Kazan, together with Astrachan, the Ukraine and Livonia, are the most temperate parts of the Russian empire. Upon the whole, the climate of Russia is not unfriendly to health and longevity. Proofs of this may be drawn from the infrequency of diseases among the common people comparatively with other countries, notwithstanding their intemperate manner of life, from the considerable number of aged persons seen in Russia, though there are few physicians, excepting in St. Petersburg and Moscow, which swarm with doctors and surgeons (and where it is remarkable that deaths are earlier), and from the great fertility of the women. The sudden transitions from cold to heat, and *vice versa*, which are occasionally experienced in Russia, are held unwholesome by many; and it must be confessed, that this is true respecting foreigners, yet only for a few years, till they are enured to these changes. For afterwards, strangers as well as natives, in spite of these vicissitudes, generally enjoy a good state of health in those provinces.

The Russian climate has, moreover, even in those regions where it is very rigorous and cold, its peculiar advantages and comforts, among which are the following: the winter, however rude and aultere, is in some respects more pleasant than the winter of countries that boast of equable temperature. From the middle of November till April, nay, in some places from September till May, it scarcely ever rains. The roads are, therefore, in winter not so

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mirey and the streets not so sloppy as with us. The snow generally falls from November to January, or from August and September to December. Afterwards the sky is almost constantly serene. It is likewise a well-known fact, that in Russia far less hardship is suffered from the cold, than in countries where the climate is incomparably milder: for there proper precautions are taken against the cold, because it is known for certain that it will be intense.

How comes it then, it will be asked, that so many people are in Russia annually frozen to death? That, for instance, in one winter, no fewer than two hundred persons in Moscow alone were found to have thus miserably perished? In a country like Russia, it may indeed unfortunately happen that persons are frozen to death, especially such as have their business out of doors. Such disasters would, however, be very rarely heard of, if the people were more prudent. It is not so much the cold, as the brandy which the labouring class gulp down in such quantities during the winter, that kills so many. From the years 1759 or 1795, no general conclusion can justly be drawn. The winter was then, in several countries, but particularly in Russia, uncommonly severe. In ordinary years, the number of these casualties throughout the empire is not so considerable.

One of the most important benefits of the Russian climate is, that in winter (as we have already hinted) the public ways and roads are in excellent order. The quantity of snow renders them perfectly level and commodious for travelling. No season is, therefore, more studiously chosen for that purpose than the depth of winter; not only for the sake of greater expedition, but many of the highways, being laid with balks or trunks of trees in all other parts of the year, are extremely rough and unpleasant.

Travelling in Russia is performed either with post-horses and *yemshiks*, or with hired horses and *iwofschiks*. At the post stations only horses are to be had; the carriage must be the traveller's. The expence of posting is trifling, in comparison of what is paid the extra post in Germany. When we travel with hired horses and *iwofschiks*, it is not necessary to have one's own carriage. We agree with the *iwofschik* or driver for horses, carriage, and provisions for the whole journey, whether fifty, a hundred, or a thousand versts. This method of travelling is somewhat more tedious than with post-horses, because the same horses being continued throughout, it is necessary to stop at nights; but it is very cheap. Of these *iwofschiks*, in St. Petersburg alone are at least five thousand. The greater part of them gain their livelihood by letting out carioles and sledges for going about the town. Each of them has a number stamped on a tin-plate at his back, which is renewed or changed every year. For long journeys coaches are rarely used, but either *schlafwagens* or *kibitkis*. Both are half covered, and made nearly in the same form; only the former are better and more commodious than the latter. In both the passenger lies upon a bed; and they are so constructed, that he can easily change his position either by lying at length or sitting upright. Both may be raised upon either wheels or sledges, as the season requires. Portmanteaus and deep trunks are not suitable to these carriages; but instead of them, flat boxes are placed beneath the bed. *Kozokes*, or sledges entirely close, having a door and a small pane of glass for a window, are likewise not uncommon.

The traveller must provide himself with wine and various other articles of diet for the whole journey; as in all Russia, to the exception of St. Petersburg, Moscow, and a few other towns, no regular inns are found, and nothing is to be had upon the road but bread, milk, which often abounds with taracans (a species of beetle deemed sacred by the vulgar Russians, believing that they procure a bless-

ing to the house), wretched quas, and still more wretched brandy. The Russian miles or versts are in length about one-seventh of a German mile, or somewhat above three quarters of an English mile. In short, 104½ versts are calculated to make one degree of the equator. A Livonian verst is rather longer than a Russian. In most parts, versts are set up from verst to verst; which though by far not so handsome as the Saxon and Hanoverian mile-stones, yet completely answer the same purpose.

One very beneficial effect of the climate ought not to be omitted, which is, that some animals change their colour in the winter. This is particularly observable with the hares and squirrels; the former turning perfectly white, the latter grey; in Siberia of so dark a grey as to border upon black, in the other parts of Russia only light grey. When the hares, however, are said to become white, it is to be understood of the generality of the common Russian hares, of the *saitzi*, which are somewhat smaller and not quite so well flavoured as the hares of Germany and England. Beyond Moscow, and in some other parts, a larger kind of hares are caught, called *ruffiki*: these retain their hue. It is certain, that this change of colour in some animals of Russia is owing to the climate, to the severity of the cold. As heat is known to expand bodies, cold must naturally have a contrary effect, and cause contraction. This effect is first and most remarkably perceptible on the surface of bodies, which in animals abounds with hair-tubes. These, on becoming contracted, can admit only the fine aqueous particles, and not the earthy parts of the blood. On this, however, depends the colour. They are white or in general brighter, when but few earthy particles can enter these hair-tubes. Such animals, therefore, as are not very strongly constituted for resisting the cold, melt, in intense frost, after shedding their original dark hair, necessarily become whiter. That the squirrels do not, like the Russian hares, turn white, but only grey, is a proof that these animals are stronger than the *saitzi*, and probably proceeds from hence, that the colour of the squirrel is naturally darker, or at least deeper, than that of the Russian hare. It is no objection, that the Siberian squirrel becomes dark grey, bordering upon black. Nothing more can be deduced from thence, than that these creatures are of an incomparably more robust and hardy nature than the Russian squirrels. However dark their hue, it is however not so deep as the red-brown which they put on in summer. The black stripe along the back they retain both in summer and winter. If this explanation of the change of colour in animals be admitted; it must follow of course, that all white animals, including the tame, are weaker than the brown, and this seems warranted by experience; at least wild cattle, which are in general accounted stronger than the tame, are commonly of a darker hue. To conclude; in Russia the *saitzi* and the squirrel in the house change their colour as completely as in the forest, fodder and nourish them how you will.

The greater part of Russia is a flat country, like Poland, of a rich soil, marshy here and there. If we except the great Verchoturian and the Ural chain of mountains, which divide Siberia from the rest of Russia, the ridge which separates Siberia from the country of the Kalmucks and Mongoles, and the Altai between the Irtisch and Ob, that between the Yenisei and the Baikal, called the Sayane mountains, and the less considerable between the Yenisei and the Lena; we scarcely find in all Russia any elevations that properly deserve the appellation of mountains.

The mountains are distributed by Mr. Tooke into eleven classes, or divisions, of which the greater part consists of principal chains of themselves, whilst others are only continuations

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tinuations of huge ridges, extending for the most part into the bordering territories; these divisions are the *Sievernaya-gori*, or northern mountains, extending between the Baltic and the White sea; the *Valday* mountains; the mountains of *Taurida*; the mountains of *Caucasus*; the *Ural* mountains; the *Altay* mountains; the *Sayane* mountains; the *Baikal* mountains; the *Nerchinskaja* mountains; the *Okhotskoy* mountains; and the *Kamtschatkoy* mountains; an account of which occurs in appropriate parts of the *Cyclopædia*.

Forests rarely occur in some parts of the Russian empire, but in others they abound even to superfluity. Such is the case between St. Petersburg and Moscow, and between Vladimir and Arfamas: also in Siberia, about the Ural mountains, in the district of the river Tara, on the Ufa as far as the Kama, and between the provinces of Perm and Ufa. The forest of Aterkskoy is in extent 75 versts.

For an account of the steppes of Russia, see **STEPPE**. The seas forming the boundaries of the Russian empire are the *Frozen*, or Northern ocean, the Eastern or *Pacific* ocean, the *Euxine* or Black sea, the *Baltic* or East sea: and the inland seas and lakes are the *Caspian*, the *Baikal*, the *Ladoga* lake, the lake *Onega*, the lake *Peipus*, the *Ilmen* lake, the *Bielo-Ozero*, or White lake, the lake *Tshany*, and the lake *Altin-nor*, which see respectively.

The chief navigable *rivers* that flow into the Baltic, are the *Duna* and the *Neva*; those that fall into the White sea are the *Dvina*, and the *Kuloi* and *Mesen*, both of which flow E. of the Dvina into the White sea, not far from each other, in the district of the town of Mesensk, the former taking its rise in the government of Archangel, and the latter in that of Vologda. The rivers that fall into the Frozen ocean are the *Petschora*, called also *Bolshaia*, which takes its rise in the western side of the Ural mountains, in the government of Vologda, and following a N.W. course falls into the northern ocean, in the government of Archangel; the *Oby*, the *Irtysb*, the *Tobol*, the *Yenissey*, the *Tunguskis*, the *Khatanga*, the *Lena*, the *Yana*, the *Indigbirka*, and the *Kolima*, which see. The rivers that flow into the Eastern or Pacific ocean are the *Anadyr*, the *Kamtschatka*, and the *Amoor* or *Amur*, formed of the *Argoon* and the *Shilka*. The rivers that flow into the Caspian are the *Yemba* or *Emba*, the *Ural*, formerly the *Yaik*, the *Volga*, which takes up the *Kamma* and the *Okka*, and the *Terek*. The rivers that fall into the Euxine are the *Kuban* or ancient *Hypanis*, the *Don* or *Tanais*, which takes up the *Voronetz*, the *Khoper*, the *Donetz*, and the *Manitsb*, the *Dnieper* or *Borysthenes*, and the *Bogue*. See each respectively. For an account of the canals of Russia, see **CANAL**.

Population of the Russian Empire.—In adverting to the *population* and *populousness* of the Russian empire, Mr. Tooke, we observe, properly distinguishes between these two terms; meaning by the former the absolute number of the inhabitants of a country, and by the latter, the relation which this number bears to the surface of ground on which they dwell. By a revision made, or at least completed, in the year 1783, the 41 viceroalties of which Russia at that time consisted, contained of male inhabitants;

Merchants	-	-	107,408
Burgbers	-	-	293,793
Odnodvortzi and free countrymen	-	-	773,656
Exempt from taxes	-	-	310,830
Crown boors	-	-	4,674,603
Private boors	-	-	6,678,239
Total			12,838,529

By doubling the above total, we obtain for the whole number of males and females in the above mentioned viceroalties, an amount of 25,677,000.

In order to obtain the augmented population since the year 1783, we have the following statement:

The total for 1783	-	-	25,677,000
The amount of the Cossacks of the Don and Euxine	-	-	220,000
Unnumbered tribes and classes at the revision in the year 1783	-	-	1,500,000
			27,397,000
Annual increase of 250,000 in 12 years	-	-	3,000,000
New acquisitions since 1783, or the nine viceroalties of Taurida, Minsk, Brazlau, Vofnesensk, Podolia, Vollynia, Courland, Vilna, and Slonim	-	-	5,755,000
			36,152,000

Whence, by the most moderate estimate, the whole population of the Russian empire may be stated for the year 1795, in round numbers, at 36,000,000.

Of this mass of population, the greatest part belongs to European Russia. The five governments of Perm, Ufa, Kolyvan, Tobolsk, and Irkutsk, comprehended under the general name of Siberia, contain, according to the revision-lists, only 2,215,000, and allowing for the unnumbered classes and tribes, perhaps above $3\frac{1}{2}$ millions of inhabitants. Hence it appears, that the population of the European part is about fourteen times greater; and the Russian empire, which, with regard to superficial contents, mostly belongs to Asia, must in respect of population be reckoned as belonging to Europe. The population of the different governments is very various; the most populous being that of Moscow, which contains upwards of 1,139,000 persons, and the least populous is that of Taurida, the inhabitants of which are computed at about 150,000.

But although the Russian empire ranks high in *population*, with respect to *populousness* its place is very subordinate. European Russia has a population of 405, and Asiatic Russia of 11 persons to a square mile: and if we compare the governments with one another, the result will be, that of 45 (the five newly acquired not being reckoned), eight contain below 100; nine contain from 100 to 500; seventeen from 500 to 1000; seven from 1000 to 1500; three from 1500 to 2000; and only one above 2000, inhabitants, on a square mile. This last honourable precedence is held by the government of Moscow, which (including the metropolis) numbers 2403 persons on the fore-said superficies. To the second class belong the governments of Kaluga, Tula, and Tchernigof: and to the third, Riazan, Kursk, Kief, Orel, Kharkof, Yaroslaf, and Novgorod Sieversk. The sixth and poorest class comprises, with the countries of the Cossacks, the north European and Siberian deserts, where the degree of population is so low, that the government of Tobolsk has but seven, and that of Irkutsk only three persons in every square geographical mile. In these countries, however, the unregistered tribes are the most numerous. The most populous district of the Russian empire lies between the 49th and 58th degrees of N. lat.; and further both to the N. and S., as well as E. beyond the 65th degree of longitude, this populousness is continually decreasing. From a table of birth, deaths, and marriages in 1799, extracted by Mr. Tooke from a German publication, we may deduce the following conclusions. The overplus of

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births, unparalleled in the annals of political economy, forms a characteristic feature of the Russian empire; and shews, that if the same increase of population should proceed for 10 years, the number of Russian subjects will be augmented by 5,000,000. It also appears, that upwards of 23 boys were born to 20 girls, whereas 104 persons only of the former died to 100 of the latter; and this favourable proportion of the males to the females indicates the military grandeur to which the Russian empire is capable of attaining; unimpeded by such wasteful wars as that which has recently occurred. Moreover, it appears that the mortality in common years throughout all the Russian dominions is as 1 to 58; whence it may be calculated, that the number of Russian subjects of the Greek church would amount, exclusively of the inhabitants of the eparchy of Brzlaw, to 31,339,620 souls. Adding to this number the inhabitants of the new possessions in Poland, which in 1795 contained 4,592,544 persons, and about 5,000,000 of Russian subjects of various Christian sects, and of the Jewish, Laman, and Schaman professions, the whole population of the Russian empire will appear to amount to upwards of 40,000,000 of souls.

Progress of Population in Russia.—The first census, namely that in 1722, gave 5,794,928 males; which, admitting an equal number of women, makes a population of 11,589,856 individuals. How much ought we to add for the new acquisitions, in which the census, or revision, as it is termed in Russia, did not take place?

According to Mr. Hermann, in his *Statistic Journal*, vol. i. part 2. p. 54, an enumeration made in Little Russia, in 1768, gave 955,228 inhabitants; another made in Finland, in 1755, gave 117,998; Esthonia, in 1773, had 176,000; Livonia, 447,360. All these make a sum total of 1,696,586 persons. These enumerations, however, being made 20, 30, 50 years after the first revision, it is possible that the population may have increased or diminished during the interval. If we compare these data with the enumeration made in 1805, we shall find that Finland, in 49 years, has gained 64,392 inhabitants; Esthonia, in 31 years, 36,948; and Livonia, 138,097: making a sum total of 239,437. The population in the provinces bordering the Baltic, then, has gained about one-fourth during the latter half of the 18th century. On comparing the population of Little Russia, as above stated, with that of the governments of Tchernigof and Pultava, a surplus will be found, in 1804, of 1,465,465 individuals above the enumeration of 1768. According to this statement, the population has more than doubled during the last 50 years. This result corresponds very well with the observations made on the registers of births and deaths, that the progress of population is very slow in the Baltic provinces, and very rapid in Little Russia. It has gained of late, especially by the commerce of Odessa; the price of land has risen considerably, and the fertile steppes have likewise been cultivated.

Admitting the like proportion in the progress of population in these provinces, during the former half of the 18th century, which is certainly a great admission, we must deduct from the above stated population of the Baltic provinces one-fourth, and there will remain 555,979; and one half of the population of Little Russia in 1768, leaving 477,614. Agreeably to this statement, the population of all the provinces acquired posterior to 1722, may be estimated at 1,033,533.

It remains now to compute what may have been the number of free persons not included in the revision. Seeing that, at the last revision of 1796, there were 16,000,000 of males included in the list of those who paid the regular

obrok, for 1,000,000 that did not pay that tax, we may compute, that at the first revision, in which the number of revisionaries was 5,000,000, there were 300,000 male freemen, composing, together with their wives, the sum of 600,000.

In conformity with these calculations, the probable population of Russia, in 1722, will be,

Revisionaries - - -	11,589,859
Free individuals - - -	600,000
Conquered provinces - - -	1,033,533
	13,223,392

Le Clerc, in his *Essay on the Population of Russia*, published in 1777, states it at 14,000,000; Benedict Francis John Hermann, at the same; which is probably accurate. But when Voltaire reckons the population during the last years of Peter the Great at 18,000,000, he confounds a later period with the era of that monarch. It appears to me, adds Mr. C. T. Hermann, that 14,000,000 would be the most probable amount, if we consider the imperfection inseparable from a first census, and the uncertainty of the calculations respecting the newly conquered provinces.

The second revision, in 1742, gives 6,673,167 males; and, supposing a like number of females, we have 13,346,334 for the inhabitants of Russia at that time. To this must be added the conquered provinces, and the free individuals. As we subtracted a fourth from the population of the Baltic provinces in 1722, the deduction of one-eighth will suffice for their population in 1742; the remainder is 648,689: and, subtracting a quarter from the population of Little Russia in 1768, there remains 706,421; making a total of 1,355,110 for the population of the conquered provinces. The number of revisionaries having augmented by 1,000,000 since 1722, we must increase the number of freemen at least by 50,000, considering the progress of industry, and the better regulations adopted by government. The population, therefore, in 1742, will be,

Revisionaries - - -	13,346,334
Free individuals - - -	700,000
Conquered provinces - - -	1,335,110
	15,381,444

Hermann admits for 1742 the round number of 16,000,000. This is a very probable estimate, as the enumerations in Russia are always below the mark.

The third revision, in 1762, gives 7,363,548 males, which supposes a total of 14,727,096 individuals; and, by the proper ratio, we take the population of the conquered provinces at 1,696,586. The revisionaries being nearly one half what they are at present, we may compute the same to hold with the freemen, which would make their number 400,000. The probable population, therefore, of 1762 is as follows:

Revisionaries - - -	14,727,096
Free individuals - - -	300,000
Conquered provinces - - -	1,696,586
	16,723,682

Marshal in 1768 and 1770, and Williams also in 1768, admit 18,000,000; l'Evêque in 1782, and le Clerc in 1783, 19,000,000; Schlötzer and Buching, in 1765, 20,000,000;

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20,000,000; and Mr. C. T. Hermann is of this last opinion. The real number, in 1762, apparently lies somewhere between 18 and 19,000,000.

The fourth general revision, in 1782, gives 12,838,529, and, with the females, 25,677,058; or, according to Hermann, 26,358,822. The two capital cities, the military and the nomadic tribes, are not included in this calculation. These at present amount to 2,960,000: at that time we may suppose them to have amounted to 2,000,000. By this statement, the population of Russia, in 1782, would have been between 27 and 28,000,000. Crome, in 1785, admits 23,000,000; Sufmilch, 24,000,000; Plefchtscheef (not reckoning the clergy, the civil establishment, the military, and the Nomades) admits 26,617,698 in 43 governments; while Hupel in 1780 to 1790, and Hermann, compute 28,000,000.

The fifth revision, in 1796, gave 17,816,370 males, which, supposing an equal number of females, makes the population amount to 35,632,740; or, according to the datum 16,223,229, (which we consider greatly below the truth,) 34,038,599. If we add the two capitals, the military, and the Nomades, computing them at 2,960,000, the population in 1796 will amount to 36,998,599. Busching and Beaufobre make it 30,000,000; Schlatzer, 33,000,000; Hermann, 33,250,000; Meusel between 35 and 36,000,000; and Storck, 36,000,000.

Following these data, the progress of population in Russia, brought on partly by the improvement of the interior, partly by new acquisitions, has been as follows:

In 1722	-	14,000,000.
1742	-	16,000,000, after 20 years.
1762	-	19,000,000, after 20 years.
1782	-	28,000,000, after 20 years.
1796	-	36,000,000, after 14 years.
1806	-	41,000,000, after 10 years.

This astonishing increment has proceeded in a great measure from new acquisitions. It would prove highly interesting, were we able to ascertain nearly the progress of the Russian population, independent of the recent acquisitions.

We shall admit for Little Russia and the Baltic provinces the number exhibited by the enumerations of 1755, 1768, and 1772, which yields a total of 1,696,586; subjoining the new acquisitions since 1773, according to the data published by general Oppermann on his map of 1796, constructed by order of government, for delineating the new limits. According to this author, Russia acquired,

	Individuals.
By the first dismemberment of Poland in 1773	1,226,966
By the peace with the Ottoman Porte in 1774 and 1783	171,610
By the peace with the same power in 1791	42,708
By the second partition of Poland in 1793	3,745,663
By the annexation of Courland	387,922
By the subsequent partition of Poland in 1795	1,407,402
Total of the acquisitions since 1773	6,982,271
Adding the Baltic provinces and Little Russia, we get	8,678,357

Here we have the total amount of the population of the countries conquered, down to 1795.

All this, however, was obtained by means of first enumerations, which were of course incorrect. Those made

down to 1804 ought to be more accurate. The administration must have acquired considerable influence, especially after the organization of the governments in 1775. It will be of importance, therefore, to know the effect of these causes, as exhibited by the last census, in 1804, which Mr. Hermann delivers to us in the following tables.

Little Russia comprehends the governments of Kief, Tchernigof, Pultava, Ukrainskoi-Slobode, with a part of Ekaterinofslaf and Kurk; to which must be added the country of the Donskoi Cossacks, as peopled by the inhabitants of Little Russia. The whole of this vast territory, called the Ukraine, formed the boundary between the Turks and Tartars. Its population, in 1804, was as follows:

	Males.	Females.
Kief - - -	574,217	538,404
Tchernigof - - -	534,712	538,570
Pultava - - -	713,772	732,639
Ukrainskoi-Slobode -	420,304	418,781
Ekaterinofslaf - -	210,815	183,363
Cossacks of the Don	161,100	194,521
	2,614,920	2,606,278

The Swedish provinces are a part of Karelia and Ingria, constituting at present the governments of St. Peterburg, Finland, Esthonia, and Livonia. Their population, in 1804, was as follows:

	Males.	Females.
St. Peterburg - - -	268,748	270,920
Finland - - -	94,397	87,393
Esthonia - - -	107,357	105,591
Livonia - - -	290,014	295,443
	760,516	759,947

So that the number of individuals in the Swedish provinces and in Little Russia is 6,741,661.

On comparing this number with the preceding enumerations, it will be seen that the Swedish provinces have gained one-fourth, and that Little Russia has nearly doubled; since it is certain that, in this last census, the several provinces belonging to Little Russia in its largest extent have not been included.

The Polish provinces annexed from 1773 to 1795, including Courland, are White Russia, Lithuania, and the Polish Ukraine, or the governments of Minsk, Vitepsk and Mohilef, Grodno and Vilna, Podolia and Volhynia. The state of their population, in 1784, was as under:

	Males.	Females.
Minsk - - -	431,586	426,940
Vitepsk - - -	343,716	330,624
Mohilef - - -	403,614	397,381
Grodno - - -	300,278	290,782
Vilna - - -	465,224	460,046
Podolia - - -	379,215	556,870
Volhynia - - -	564,586	522,182
Courland - - -	191,910	189,366
	3,080,129	3,174,191

According to general Oppermann, the population of these provinces, in 1796, amounted to 6,767,953; whence it appears that the population of Poland is stationary.

The Turkish provinces are Cherfon, Taurida, the country of the Cossacks of the Euxine, and the residue of Ekate-

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The fifth revision, in 1796, gave 17,816,370 males, which, supposing an equal number of females, makes the population amount to 35,632,740: or, according to the datum 16,223,229, (which we consider greatly below the truth,) 34,038,599. If we add the two capitals, the military, and the Nomades, computing them at 2,960,000, the population in 1796 will amount to 36,998,599. Busching and Beaufobre make it 30,000,000; Schlätzer, 33,000,000; Hermann, 33,250,000; Meufel between 35 and 36,000,000; and Storek, 36,000,000.

Following these data, the progress of population in Russia, brought on partly by the improvement of the interior, partly by new acquisitions, has been as follows:

In 1722	-	14,000,000.
1742	-	16,000,000, after 20 years.
1762	-	19,000,000, after 20 years.
1782	-	28,000,000, after 20 years.
1796	-	36,000,000, after 14 years.
1806	-	41,000,000, after 10 years.

This astonishing increment has proceeded in a great measure from new acquisitions. It would prove highly interesting, were we able to ascertain nearly the progress of the Russian population, independent of the recent acquisitions.

We shall admit for Little Russia and the Baltic provinces the number exhibited by the enumerations of 1755, 1768, and 1772, which yields a total of 1,696,586; subjoining the new acquisitions since 1773, according to the data published by general Oppermann on his map of 1796, constructed by order of government, for delineating the new limits. According to this author, Russia acquired,

	Individuals.
By the first dismemberment of Poland in 1773	1,226,966
By the peace with the Ottoman Porte in 1774 and 1783	171,610
By the peace with the same power in 1791	42,708
By the second partition of Poland in 1793	3,745,663
By the annexation of Courland	387,922
By the subsequent partition of Poland in 1795	1,407,402
Total of the acquisitions since 1773	6,982,271
Adding the Baltic provinces and Little Russia, we get	8,678,357

Here we have the total amount of the population of the countries conquered, down to 1795.

All this, however, was obtained by means of first enumerations, which were of course incorrect. Those made

down to 1804 ought to be more accurate. The administration must have acquired considerable influence, especially after the organization of the governments in 1775. It will be of importance, therefore, to know the effect of these causes, as exhibited by the last census, in 1804, which Mr. Hermann delivers to us in the following tables.

Little Russia comprehends the governments of Kief, Tchernigof, Pultava, Ukrainkoi-slobode, with a part of Ekaterinoslaf and Kursk; to which must be added the country of the Donkoi Cossacks, as peopled by the inhabitants of Little Russia. The whole of this vast territory, called the Ukraine, formed the boundary between the Turks and Tartars. Its population, in 1804, was as follows:

	Males.	Females.
Kief - - -	574,217	538,404
Tchernigof - - -	534,712	538,570
Pultava - - -	713,772	732,639
Ukrainkoi-slobode - - -	420,304	418,781
Ekaterinoslaf - - -	210,815	183,363
Cossacks of the Don	161,100	194,521
	2,614,920	2,606,278

The Swedish provinces are a part of Karelia and Ingria, constituting at present the governments of St. Petersburg, Finland, Esthonia, and Livonia. Their population, in 1804, was as follows:

	Males.	Females.
St. Petersburg - - -	268,748	270,920
Finland - - -	94,397	87,393
Esthonia - - -	107,357	105,591
Livonia - - -	290,014	295,443
	760,516	759,947

So that the number of individuals in the Swedish provinces and in Little Russia is 6,741,661.

On comparing this number with the preceding enumerations, it will be seen that the Swedish provinces have gained one-fourth, and that Little Russia has nearly doubled; since it is certain that, in this last census, the several provinces belonging to Little Russia in its largest extent have not been included.

The Polish provinces annexed from 1773 to 1795, including Courland, are White Russia, Lithuania, and the Polish Ukraine, or the governments of Minsk, Vitepsk and Mohilef, Grodno and Vilna, Podolia and Volhynia. The state of their population, in 1784, was as under:

	Males.	Females.
Minsk - - -	431,586	426,940
Vitepsk - - -	343,716	330,624
Mohilef - - -	403,614	397,381
Grodno - - -	300,278	290,782
Vilna - - -	465,224	460,046
Podolia - - -	379,215	556,870
Volhynia - - -	564,586	522,182
Courland - - -	191,910	189,366
	3,080,129	3,174,191

According to general Oppermann, the population of these provinces, in 1796, amounted to 6,767,953; whence it appears that the population of Poland is stationary.

The Turkish provinces are Cherson, Taurida, the country of the Cossacks of the Euxine, and the residue of Ekate-

Ekate-

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Ekaterinoflaf, to which may be added Caucafia. The population of thefe provinces is,

	Males.	Females.
Cherfon - - -	145,814	124,321
Taurida - - -	102,826	88,864
Coffacks of the Euxine	20,240	9,155
Caucafia - - -	34,849	29,240
	303,729	251,580

As the Coffacks of the Euxine have very few women, and ftill retain many customs derived from their ancestors, the famous Zaporogian Coffacks, fo called from *za, trans*, beyond, and *parogi*, cataracts, (the Coffacks beyond the cataracts,) the foregoing ftatement is probably correct. We learn from general Oppermann, that in the Turkish provinces conquered in 1774, 1783, and 1791, there were 214,318 individuals of both fexes. This fmall population, in a tract of country fo immense, has increased undoubtedly, in confequence of a more regular adminiftration; but not fo much as would at firft fight appear, becaufe we muft ftrike off the Coffacks of the Euxine, Caucafia, and the Ruflian and foreign colonies domiciliated in thefe regions. Befides, if we confider the incompleteness of a firft enumeration, it is but reafonable to fuppofe that general Oppermann's estimate is too fmall.

Thus it appears that the population of the territories acquired fince 1773 was, in 1804,

Little Ruffia - - -	5,221,198	
Swedish provinces - - -	1,520,463	
Polifh provinces - - -	6,454,320	
Turkifh provinces - - -	555,309	
	13,751,290	

According to the data above noticed, we are to fubtract from the aggregate population of Ruffia, for the provinces acquired,

From 14,000,000 in 1722	1,033,533	
	-	12,966,467
From 16,000,000 in 1742	1,355,110	
	-	14,644,890
From 19,000,000 in 1762	1,696,586	
	-	17,303,414
From 28,000,000 in 1782	8,678,857	
	-	19,321,143
From 36,000,000 in 1796	13,751,290	
	-	22,248,710
From 41,000,000 in 1806	13,751,290	
	-	27,248,710

The laft column gives us the rate at which the population of Ruffia proper has increafed.

Whence it follows, that the population of Ruffia, exclusive of the conquifits fince the reign of Peter I., gained in 20 years, between 1722 and 1742, 1,678,423, or 83,921 annually. In the 20 years between 1742 and 1762, 2,658,524, or 132,926 annually; that is to fay, 49,005 more annually than during the firft period. In the 20 years between 1762 and 1782, 1,676,253, or 88,812 annually;

lefs by 49,114 than during the fecond period. In the 14 years between 1782 and 1796, 2,927,567, or 146,378 annually; more by 62,566 than during the preceding period. In the 10 years between 1796 and 1806, 5,000,000, or 200,000 annually; more by 53,622 than during the antecedent period.

By the above table, it is obvious that the population of Old Ruffia has more than doubled, or that it is at prefent to what it was in 1722, as 2½ to 1. It is apparent alfo that the progrefs of population has not been uniform, that it has had accelerations and retardations, that the moft favourable periods were during the reign of the emperrefs Elizabeth, between 1741 and 1761, and the years of the peace of Catharine II. between 1782 and 1796. The population ftill advances in the later periods, but the rate is flower. What may be the caufe of thefe phenomena?

The population of Ruffia has more than doubled during the laft century, though Smith fuppofes that the population in civilized countries only doubles once in 500 years. It has doubled in confequence of a better regulated adminiftration; of the fecurity the government has afforded to the nation; of the capitals belonging to foreigners placed in the country, and which for a long time conftituted the foul of the inland commerce; in confequence of the progrefs of national induftry, which was the refult; of the increafe of knowledge, by new commercial connections with other countries of Europe, and by the means of inftruction furnifhed by government to the other inhabitants of Ruffia; and, finally, in confequence of the removal of feveral obftacles which checked the progrefs of induftry, as the abolition of the custom-houfes of the interior, under the reigns of the emperrefs Elizabeth and Catharine II., the improvement of the roads, and the multiplication of canals.

What a difmal picture does Ruffia prefent to us in the fifteenth, fixteenth, and feventeenth centuries! Jofafa Barbaro, in 1436, reports, that from Mofcow to the frontiers of Poland, the whole country was one vaft defart; the villages, burnt and abandoned, offered no other accommodation to ftangers than a place to kindle a fire. Contarini confirms this ftatement in 1483. Meyerberg, in 1661, found between Viazma and Mofaik, a diftance of 130 verfts, only a fingle village. The road between Smolensk and Mofcow was dangerous, according to Lyfbeck, in 1675, on account of the wolves that attacked travellers. Ulfeldt, the Danifh ambaffador, in 1625, found the country between Mofcow, Novgorod, and Pfcove, laid entirely wafte by the intestine wars under Ivan Vaffillievitch II. Poffevin, in 1581 and 1582, travelled whole days in the interior of Ruffia without meeting a fingle individual. The whole country between Kazan and Altrachan was a continued defart. Even the cities had greatly fuffered. Poffevin estimates the population of Mofcow at 30,000; that of Novgorod was diminished by the plague to 3000; and Kief, in the time of Herberftein, in 1516, was almoft in ruins. Befides the devaftations committed by the domeftic feuds and foreign invaders, the number of impofits, and the feverity of the commiffioners who levied them, depopulated the northern provinces which had not fuffered from thofe difafters. We learn from Fletcher, that in the year 1588, 50 villages were abandoned between Vologda and Yaroflaf. At Uftiug bread was almoft unknown, and the fame deftitution of that article of life was felt on the Dvina in the time of Herberftein. Famine and peftilence often committed their ravages among the melancholy remnants of this unfortunate population, as in 1525, in 1601, and in 1615. M. Meiner informs us, that the city of Novgorod loft in one winter no fewer than 18,000 individuals, conftituting nearly the whole of its population.

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It is neither to the mildness of the climate, nor to the fertility of the soil, that we are to ascribe the rapid increase of population during the eighteenth century; but to a better organized administration, and the security which resulted from it. An infant state, supposing it tolerably well governed, and connected with countries long civilized, ought to make prodigious progress in improvement and population.

That period of the reign of Catharine II., in which she took in hand the amelioration of the several governments, was particularly propitious to the progress of population. The organization of the governments in 1775 was the great political scheme that procured the subjects a greater degree of security and happiness. The ukase of 1782, respecting the liberty of working the mines, the establishment of normal schools in 1783, the rights granted to the nobility in 1785, the improvement of the high roads in 1786, and especially the erection of the bank in the same year, were all calculated to promote the happiness of the subject, as far as it depended on the government. The bank, from its very commencement, had a surprising effect upon the progress of agriculture. That patriotic sovereign removed several obstacles to the prosperity of her subjects, such as the want of liberty to be industrious, the want of communications, the want of knowledge, and of a medium of circulation.

The population of Russia has more than doubled during the eighteenth century. Have we reason to expect the same progress during the nineteenth?

If we consider only the extent of the surface capable of cultivation, which is computed at 80,000,000 of square miles, we must conclude that Russia is capable of supporting 960,000,000 of inhabitants, or almost as many as at present exist on the earth. If we consider the surplus of births as a total gain to the population, this surplus, amounting at least to 500,000 annually, would in 32 years amount to 60,000,000, in 56, to 80,000,000, &c.

Experience, however, shews us that the progress of population does not depend solely upon the extent of soil capable of cultivation. There are spots left uncultivated in the countries where agriculture has made the greatest advances, even in England, Flanders, and Lombardy. This progress depends still less on the surplus of births. Every where the number of births exceeds that of deaths. The population is always proportionate to the state of national wealth. The most decisive proof, therefore, of the prosperity of a country, is the increase of the number of its inhabitants. In Russia the population has more than doubled in 34 years. Whence we may infer, that its agriculture, the principal branch of its industry, has also doubled. The increase of Russian commerce depends upon peace, and upon the augmentation of knowledge. On these accounts we cannot expect so rapid an increase of national riches, and consequently of population, during the nineteenth century as obtained during the eighteenth.

Experience has demonstrated the accuracy of this mode of reasoning. The progress of the population has become slower since the fifth revision. The annual surplus of 60,000 has been reduced to 50,000 during the last ten years.

To establish this fact, M. Hermann has compared the statements respecting the population of the governments of Moscow, Tula, Kaluga, Yaroslaf, Orel, Kursk, Vladimir, Riazan, Penza, Kazan, Tver, Smolensk, Tambow, Nijegorod, Pfcove, Voronetch, Simbirsk, Kostroma, Viatka, Novgorod, Saratof, Perm, Orenburg, Vologda, Olonetz. The statements respecting the population of these 25 governments, according to the fourth revision of 1782, gives

9,939,790, males; that of the fifth revision of 1796, fourteen years after, 10,228,672; that of the enumeration of 1804, eight years after, 9,989,531. So that the population gained during the first period 867,873, and during the second period lost 239,141. In the first period there are only three governments whose population has diminished; *viz.* Kaluga, Kostroma, and Voronetch. All the others had increased. But during the second period Moscow alone gained considerably, namely, 100,000 males; Voronetch, which had lost before, gained 150,000 males; and Viatka gained 37,000. Kursk and Orel have gained a few thousands; Tula, Yaroslaf, and Perm, some hundreds. The other seventeen governments have lost, and several of them considerably. In like manner, Tambow has lost 88,000 men, Nijegorod 55,000, and Simbirsk 10,000 men in eight years!

It is worthy of observation, that those governments which have been long in a high state of cultivation, as Tula, Yaroslaf, Kaluga, Tver, Pfcove, Kostroma, Smolensk, Vladimir, have neither lost nor gained much. The population, and of course the industry, is stationary. The governments less improved, as Viatka and Voronetch, have gained conspicuously; whereas the governments richest in corn, as Tambow, Nijegorod, Simbirsk, have lost the most.

The rapid progress of population between the fourth and fifth revisions is the natural effect of the sensible advances made by agriculture, in consequence of the many recent beneficial institutions, and especially the establishment of the bank. These institutions and new funds have already produced their effect. At present, the ancient sources of national wealth flow less abundantly, and it is not easy to open new ones. It may be presumed then, that the population of Russia will remain a long time between 41,000,000 and 43,000,000. Unforeseen circumstances, however, may give a considerable population to the south of Russia. For instance, the astonishing commerce of grain at Odesa, between 1800 and 1805, increased the value of all the lands as far as Kief, and even the fertile steppes were brought into cultivation. Labourers were wanting; and even half the produce was offered to those who would gather in the other half. The commerce of Taganrok likewise furnishes ground for hope: and agriculture appears to be making some progress among the nomadic tribes.

A country is sufficiently peopled when the generality of the inhabitants are in easy circumstances. Such a population alone is desirable, and useful to government. A country is not sufficiently peopled when the demand for labourers, and the means of maintaining them, are excessive, as in some of the southern provinces of Russia. A country suffers from its population, when the thousands of rich are obliged to maintain the millions of poor. Such a fallacious population must either perish, or emigrate, or occasion revolutions.

The nations inhabiting the Russian empire are; Russians, Cossacks, of whom are four denominations, Samoyedes, Morduanes, Cheremisses, Chuvashes, Votiaks, Vogules, Perniaks, Sirianes, Oltiaks, Barabinses, Tunguses, divided into the Connei Tungusi, Olenni Tungusi, and Sabathsi Tungusi, thus discriminated because some Tunguses travel with horses, some with rein-deer, and others with large dogs, Kalmucks, Burats, Yakutes, Yukagiri, Korzaki, Kamthadales, Tartars, who are likewise divided into several kinds, Finns, Esthonians, Lettes, Livonians, Armenians, Indians, besides the Germans and other Europeans. To these might be added the Chuktshi, Tshalatshi, the Kurilli, and perhaps yet others. These different tribes and populations are of as various manners, tempers, and habits of life: to specify them distinctly would engage us in too wide a field

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Ekaterinoflaf, to which may be added Caucasia. The population of these provinces is,

	Males.	Females.
Cherfon - - -	145,814	124,321
Taurida - - -	102,826	88,864
Cossacks of the Euxine	20,240	9,155
Caucasia - - -	34,849	29,240
	303,729	251,580

As the Cossacks of the Euxine have very few women, and still retain many customs derived from their ancestors, the famous Zaporogian Cossacks, so called from *za, trans*, beyond, and *parogi*, cataracts, (the Cossacks beyond the cataracts,) the foregoing statement is probably correct. We learn from general Oppermann, that in the Turkish provinces conquered in 1774, 1783, and 1791, there were 214,318 individuals of both sexes. This small population, in a tract of country so immense, has increased undoubtedly, in consequence of a more regular administration; but not so much as would at first sight appear, because we must strike off the Cossacks of the Euxine, Caucasia, and the Russian and foreign colonies domiciliated in these regions. Besides, if we consider the incompleteness of a first enumeration, it is but reasonable to suppose that general Oppermann's estimate is too small.

Thus it appears that the population of the territories acquired since 1773 was, in 1804,

Little Russia - - -	5,221,198
Swedish provinces - - -	1,520,463
Polish provinces - - -	6,454,320
Turkish provinces - - -	555,309
	13,751,290

According to the data above noticed, we are to subtract from the aggregate population of Russia, for the provinces acquired,

From 14,000,000 in 1722		
1,033,533	-	
		12,966,467
From 16,000,000 in 1742		
1,355,110	-	
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8,678,857	-	
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From 36,000,000 in 1796		
13,751,290	-	
		22,248,710
From 41,000,000 in 1806		
13,751,290	-	
		27,248,710

The last column gives us the rate at which the population of Russia proper has increased.

Whence it follows, that the population of Russia, exclusive of the conquests since the reign of Peter I., gained in 20 years, between 1722 and 1742, 1,678,423, or 83,921 annually. In the 20 years between 1742 and 1762, 2,658,524, or 132,926 annually; that is to say, 49,005 more annually than during the first period. In the 20 years between 1762 and 1782, 1,676,253, or 88,812 annually;

less by 49,114 than during the second period. In the 14 years between 1782 and 1796, 2,927,567, or 146,378 annually; more by 62,566 than during the preceding period. In the 10 years between 1796 and 1806, 5,000,000, or 200,000 annually; more by 53,622 than during the antecedent period.

By the above table, it is obvious that the population of Old Russia has more than doubled, or that it is at present to what it was in 1722, as 2½ to 1. It is apparent also that the progress of population has not been uniform, that it has had accelerations and retardations, that the most favourable periods were during the reign of the empress Elizabeth, between 1741 and 1761, and the years of the peace of Catharine II. between 1782 and 1796. The population still advances in the later periods, but the rate is slower. What may be the cause of these phenomena?

The population of Russia has more than doubled during the last century, though Smith supposes that the population in civilized countries only doubles once in 500 years. It has doubled in consequence of a better regulated administration; of the security the government has afforded to the nation; of the capitals belonging to foreigners placed in the country, and which for a long time constituted the soul of the inland commerce; in consequence of the progress of national industry, which was the result; of the increase of knowledge, by new commercial connections with other countries of Europe, and by the means of instruction furnished by government to the other inhabitants of Russia; and, finally, in consequence of the removal of several obstacles which checked the progress of industry, as the abolition of the custom-houses of the interior, under the reigns of the empresses Elizabeth and Catharine II., the improvement of the roads, and the multiplication of canals.

What a dismal picture does Russia present to us in the fifteenth, sixteenth, and seventeenth centuries! Jofafa Barbaro, in 1436, reports, that from Moscow to the frontiers of Poland, the whole country was one vast desert; the villages, burnt and abandoned, offered no other accommodation to strangers than a place to kindle a fire. Contarini confirms this statement in 1483. Meyerberg, in 1661, found between Viasma and Mosaisk, a distance of 130 versts, only a single village. The road between Smolensk and Moscow was dangerous, according to Lyfbeck, in 1675, on account of the wolves that attacked travellers. Ulfeldt, the Danish ambassador, in 1625, found the country between Moscow, Novgorod, and Pfcove, laid entirely waste by the intestine wars under Ivan Vassillievitch II. Possévin, in 1581 and 1582, travelled whole days in the interior of Russia without meeting a single individual. The whole country between Kazan and Aitrachan was a continued desert. Even the cities had greatly suffered. Possévin estimates the population of Moscow at 30,000; that of Novgorod was diminished by the plague to 3000; and Kief, in the time of Herberstein, in 1516, was almost in ruins. Besides the devastations committed by the domestic feuds and foreign invaders, the number of imports, and the severity of the commissioners who levied them, depopulated the northern provinces which had not suffered from those disasters. We learn from Fletcher, that in the year 1588, 50 villages were abandoned between Vologda and Yaroslaf. At Usting bread was almost unknown, and the same destitution of that article of life was felt on the Dvina in the time of Herberstein. Famine and pestilence often committed their ravages among the melancholy remnants of this unfortunate population, as in 1525, in 1601, and in 1615. M. Meiner informs us, that the city of Novgorod lost in one winter no fewer than 18,000 individuals, constituting nearly the whole of its population.

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That period of the reign of Catharine II., in which she took in hand the amelioration of the several governments, was particularly propitious to the progress of population. The organization of the governments in 1775 was the great political scheme that procured the subjects a greater degree of security and happiness. The ukase of 1782, respecting the liberty of working the mines, the establishment of normal schools in 1783, the rights granted to the nobility in 1785, the improvement of the high roads in 1786, and especially the erection of the bank in the same year, were all calculated to promote the happiness of the subject, as far as it depended on the government. The bank, from its very commencement, had a surprising effect upon the progress of agriculture. That patriotic sovereign removed several obstacles to the prosperity of her subjects, such as the want of liberty to be industrious, the want of communications, the want of knowledge, and of a medium of circulation.

The population of Russia has more than doubled during the eighteenth century. Have we reason to expect the same progress during the nineteenth?

If we consider only the extent of the surface capable of cultivation, which is computed at 80,000,000 of square miles, we must conclude that Russia is capable of supporting 960,000,000 of inhabitants, or almost as many as at present exist on the earth. If we consider the surplus of births as a total gain to the population, this surplus, amounting at least to 500,000 annually, would in 32 years amount to 60,000,000, in 56, to 80,000,000, &c.

Experience, however, shews us that the progress of population does not depend solely upon the extent of soil capable of cultivation. There are spots left uncultivated in the countries where agriculture has made the greatest advances, even in England, Flanders, and Lombardy. This progress depends still less on the surplus of births. Every where the number of births exceeds that of deaths. The population is always proportionate to the state of national wealth. The most decisive proof, therefore, of the prosperity of a country, is the increase of the number of its inhabitants. In Russia the population has more than doubled in 34 years. Whence we may infer, that its agriculture, the principal branch of its industry, has also doubled. The increase of Russian commerce depends upon peace, and upon the augmentation of knowledge. On these accounts we cannot expect so rapid an increase of national riches, and consequently of population, during the nineteenth century as obtained during the eighteenth.

Experience has demonstrated the accuracy of this mode of reasoning. The progress of the population has become slower since the fifth revision. The annual surplus of 60,000 has been reduced to 50,000 during the last ten years.

To establish this fact, M. Hermann has compared the statements respecting the population of the governments of Moscow, Tula, Kaluga, Yaroslaf, Orel, Kursk, Vladimir, Riazan, Penza, Kazan, Tver, Smolensk, Tambof, Nijegorod, Pfcove, Voronetch, Simbirsck, Kostroma, Viætka, Novgorod, Saratof, Perm, Orenburg, Vologda, Olonetz. The statements respecting the population of these 25 governments, according to the fourth revision of 1782, gives

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It is worthy of observation, that those governments which have been long in a high state of cultivation, as Tula, Yaroslaf, Kaluga, Tver, Pfcove, Kostroma, Smolensk, Vladimir, have neither lost nor gained much. The population, and of course the industry, is stationary. The governments less improved, as Viætka and Voronetch, have gained conspicuously; whereas the governments richest in corn, as Tambof, Nijegorod, Simbirsck, have lost the most.

The rapid progress of population between the fourth and fifth revisions is the natural effect of the sensible advances made by agriculture, in consequence of the many recent beneficial institutions, and especially the establishment of the bank. These institutions and new funds have already produced their effect. At present, the ancient sources of national wealth flow less abundantly, and it is not easy to open new ones. It may be presumed then, that the population of Russia will remain a long time between 41,000,000 and 43,000,000. Unforeseen circumstances, however, may give a considerable population to the south of Russia. For instance, the astonishing commerce of grain at Odessa, between 1800 and 1805, increased the value of all the lands as far as Kief, and even the fertile steppes were brought into cultivation. Labourers were wanting; and even half the produce was offered to those who would gather in the other half. The commerce of Taganrok likewise furnishes ground for hope: and agriculture appears to be making some progress among the nomadic tribes.

A country is sufficiently peopled when the generality of the inhabitants are in easy circumstances. Such a population alone is desirable, and useful to government. A country is not sufficiently peopled when the demand for labourers, and the means of maintaining them, are excessive, as in some of the southern provinces of Russia. A country suffers from its population, when the thousands of rich are obliged to maintain the millions of poor. Such a fallacious population must either perish, or emigrate, or occasion revolutions.

The nations inhabiting the Russian empire are; Russians, Cossacks, of whom are four denominations, Samoyedes, Morduanes, Cheremisses, Chuvashes, Votiaks, Vogules, Perniaks, Sirianes, Ostiaks, Barabinses, Tunguses, divided into the Connei Tungusi, Olenni Tungusi, and Sabatshi Tungusi, thus discriminated because some Tunguses travel with horses, some with rein-deer, and others with large dogs, Kalmucks, Burats, Yakutes, Yukagiri, Korzaki, Kamthadales, Tartars, who are likewise divided into several kinds, Finns, Esthonians, Lettes, Livonians, Armenians, Indians, besides the Germans and other Europeans. To these might be added the Chuktshi, Tshalatshi, the Kurilli, and perhaps yet others. These different tribes and populations are of as various manners, tempers, and habits of life: to specify them distinctly would engage us in too wide a field

of description. But of the principal nation, the Russians, it will be expected of us to make some observations.

Characteristics, &c. of the Inhabitants of Russia.—The Russians are described as a moderate-sized, vigorous, and durable race of men. Their growth and longevity, however, are different in different districts; but upon the whole they are rather large than small, commonly well-built, and very seldom deformed. Their common or discriminating features are, a small mouth, thin lips, white teeth, little eyes, low forehead, and nose often small and turned upwards; the beard almost always very bushy, and the hair varying from dark-brown to red; but seldom quite black. Their countenance expresses gravity and good nature or sagacity. Their senses of sight and hearing are very acute, and the gait or jestures of the body indicate a peculiar and often impassioned vivacity. As to the females, a delicate skin and ruddy complexion are in the vulgar opinion regarded as the first requisites of beauty. Young girls arrive at maturity in the 12th or 13th year, and this is ascribed to the frequent use of hot baths; but on the same account married women seldom retain the fresh complexion and the peculiar charms of youth beyond the first lying-in.

The character of the Russians is mixed, like that of most other nations, as well as of individuals; the Russian character is, however, composed of a very extraordinary mixture. The Russians are a people who, with a particular degree of pride, combine much submissiveness, levity, kindness, especially towards foreigners, prudence and cunning on one hand, but likewise fidelity and honesty, on the other, a certain propensity to superstition and usury, and a great proportion of selfishness. The Russian easily runs from one extreme to the other. Prone as he is to superstition, so apt is he to be carried into the contrary failing. He hesitates long before he engages in friendship; but being then generally firm in his attachment, he is revengeful when, in spite of his caution, he is deceived in the choice of his friend: while he scolds, threatens, and rages, no harm is to be apprehended; but if he makes no noise when he thinks himself offended, he is a dangerous enemy. He is greatly swayed by self-interest, and surrenders himself entirely to the impetuosity of his passions. Gaming and drinking have an irresistible authority over him. Among the lower sort it is generally the men who give themselves up to these excesses; though, indeed, a drunken woman staggering along the streets is no uncommon sight. The Russians are remarkable for their comeliness of person, strength of body, courage and intrepidity in war, ingenuity, wit, and obedience to the commands of their superiors.

The insatiable greediness of the common people for spiritous liquors, especially in the *maslanitza*, or carnival season, is in a great measure ascribable to the rigorous fasts of the church, and the slender diet they live upon throughout the year. Their food chiefly consists of turnips, cabbages, pease, salt-cucumbers, onions, coarse fish, with oil and black bread. Their common beverage is quas, which is a kind of acidulated small beer.

The Russian women are excessively fond of paint, and look upon ruddy cheeks as the very essence of beauty; so that in the Russian language, red and beautiful are convertible terms. Even the village girls all over the country know how to prepare a particular herb to the purposes of rouge.

Persons of distinction dress after the German and French fashion, and are passionately addicted to itate and splendour. The dress of the common people is coarse and simple, but they are neat and cleanly in their apparel. Both sexes wear a crucifix on their breasts, suspended round the neck by a

string, which is put on at their baptism, and never afterwards put off; those of the peasants are of lead; but the better sort have them of silver or gold. The peasants let their beards grow to their full length. In Russia there are few peculiar diseases. The common Russians use but few medicines, their place being supplied by the sweating-bath; and indeed baths have been common in this country from time immemorial. In the bath-room the heat is usually from 32° to 40° of Reaumur; and by throwing water every five minutes on the glowing hot stones in the chamber of the oven the heat rises to 44°. The vapour-bath is habitually used by the Russians once or twice a week; for which purpose almost every house has the necessary apartment. They often fally forth naked from the bath, run about in the cold, and roll themselves in the snow, or in summer plunge into the water, and then rush again into the bath.

A particular air of grace and civility is observable in the salutations even of the common people to one another; but on entering a room, before they greet the company, the custom is to make repeatedly the sign of the cross, at the same time bowing as often to the picture of some saint, which is so placed in every room as to be seen immediately on coming in. In visits of ceremony, it is usual for both men and women to welcome each other with a kiss. Great deference, approaching to servility, is shewn to persons of superior rank.

The nation consists chiefly of the nobility and peasantry, to which we may add the burgeses and the Kozaks or Cossacks. The nobility formerly consisted solely of knæses or princes. Boyar is not a title of nobility, but anciently denoted the possessor of a post or office, as a privy counsellor, &c. To the former, Peter the Great added the titles of count and baron. The knæses are extremely numerous, and, therefore, unless very rich, or of illustrious races, not greatly honoured. This great multitude of knæses proceeded, among other causes, from the custom of giving that title to the baptized Tartarian murzas, in the idea that murza, among the Tartars, was of nearly the same import as knæs. Every knæs, as well as every count, even though no more than a common soldier, has, in virtue of his birth, the style of *vashé siatelstvo*, which is commonly translated *your excellency*. The nobles may be proprietors of land and people, and hold the highest offices in the civil and military departments. The "Dvorianini" are a kind of city-nobles, and the "Odnodvortzoi" are the lowest class of noblesse. The burgher state, yeomanry, or commonalty, is composed of the "Polsatki" and "Rasnotshintzi," who live in towns and villages, governed by their proper magistrates, whether as merchants or tradesmen. They are excluded from offices and posts of service of honour, and furnish head-money and recruits, but cannot be vassals. The peasants are vassals of the great, attached to the soil, *gleba adscripti*, and groan under many oppressions: far, however, from being dull and stupid, they are remarkably ready witted, and are in no want of natural parts. Of the peasantry, such as belong to the crown and the monasteries pay taxes according to the laws of the land, and are liable to other duties imposed by the same authority; but they may be transferred as donatives from the crown. They may pursue trade, in connection with their rural concerns, if they think it beneficial or convenient. Noble boors are the vassals of their lord; from these recruits for the army are taken by lot. Cossacks form a particular class originating from the peasantry; they live exempt from taxes in villages, forts, and petty towns, on the produce of their fields and pastures, or the labour of their hands; they furnish no recruits, and are not given away as serfs, and they enjoy other privileges. But they all serve as light-horsemen, as early and as long

as they are fit for it, providing themselves with horses, clothes, and accoutrements, and only receive pay when they are in actual service. See COSSACKS.

The intercourse between the sexes is more free than in other countries, which is owing to the contracted space of their habitations and sleeping rooms, their baths, the simplicity of their conversation, and their artless songs. The behaviour of husbands towards their wives is, in comparison with that of more polished nations, rough and austere. The marriage contract is made with mercantile punctuality; the betrothing is performed with ecclesiastical rites, generally eight days previous to the marriage, and is indissoluble. The marriage is solemnized in the church before the altar, to which they proceed with the figure of some saint carried before them; and during the ceremony a crown is put on each of the heads of the married pair. The priest, with due forms, changes their rings, admonishes them of their reciprocal duties, gives them a cup to drink, in token of the union of their fortunes, and dismisses them with his blessing.

The national diversions of the Russians on holidays, at weddings, and on other occasions of festivity, are very various, and much resemble those that are customary with the Persians, Arabians, and Egyptians. Their music is more usually vocal than instrumental. Their songs are simple recitations, ancient or modern, on the subjects of love, nature, and tales of chivalry, giants, and heroes, frequently lewd; and their melodies are uniform and monotonous, but sometimes sufficiently pleasing. The little groups of girls, sitting together in an evening and singing, afford much amusement. The most complete vocal music is that which is heard in their churches, on Sundays and holidays; which, as the church allows of no instrumental music in divine worship, is performed by singers expressly taught and mostly brought from the Ukraine. The substance is Slavonian poetry; the notes are expressed by points, after the very old fashion, for four voices. The present choral music is mostly by mottete. The most common instrument of the nation is the Cow-horn, which is a kind of cornet, of from one to four feet in length, made of wood or tree-bark. For a description of the balalaika, see BALALAIKA. The gudak is a miserable violin with three strings: the dutka consists of two parallel reed-pipes, each with three holes, differing in their notes up to an octave, so that the hearer conceives that two are played on it. The rielek is a common village lyre; and the valinka a diminutive pair of bagpipes. The gussli is a horizontal harp with wires, played on with the fingers, and capable of any kind of music: it is a pleasing instrument and much used; and so is likewise the cornet among sailors and boatmen: the sailors also make a kind of jingling noise with two bunches of little bells, keeping time with their music. Dancing is a diversion to which the Russians are very much devoted; and they are no less attached to gymnastic pastimes.

The dead are long and sincerely lamented by their surviving relations; but, from a natural repugnance to the idea of death, they use little ceremony with the corpse. They bring it to the grave in an open coffin, covered only with a pall, attended by priests, chanting hymns, and bearing crosses and lighted tapers in their hands. At the place of interment they take leave of the body by a kiss, then fallen up the coffin, and let it down into the grave. Persons of the lower class bury their dead in their ordinary clothes. At the new year is annually held a feast of the dead, on which occasion every body visits the grave of his relations, lays some victuals upon it, and hears mass, in payment for which the priests get the victuals.

The ancient orthodox Greek religion is universally ac-

knowledged both in doctrine and discipline. (See GREEK CHURCH.) The churches and sacerdotal vestments are very magnificent. The people are strict in the observance of the outward forms of religion; attendance on mass, keeping the fasts (which take up one-third of the year), performance of domestic devotions, confession, receiving the sacrament, &c. Passion week is observed with great apparent solemnity; but Easter week is passed much as in other countries, in various diversions, drunkenness, and debauchery. The Russians are superstitious, both in their notions and practices, believing in ghosts, apparitions, and hobgoblins. Some specimens of their superstitions we shall here subjoin. On the Thursday before Whitsuntide, the girls celebrate the festival of the Slavonian goddess Lada and her son Dida, with singing, dancing, and decorating a birch-bush with garlands of ribbons; which they afterwards throw with much solemnity into a river, and infer, from the figures assumed by the ribbons in the current, to whom they shall be married, and their subsequent condition. On the fifth of January they go by night into a cross-street, or into a cellar, which is called "To go hearing," and fancy they hear, in every sound, the prediction of their destiny. The day after Christmas is solemnized by the midwives, because the Virgin Mary's midwife had a great hand in the redemption of the world: but it is needless to enlarge in this way.

The clergy in Russia enjoy peculiar privileges; they cannot suffer corporal punishment without being previously defecrated, and they are exempt from taxes. The empire comprehends, according to the usual enumeration, 18,350 parish churches and cathedrals of the orthodox Greek religion. The number of Russian clergy is computed at 67,900 persons, without including their families. Some authors assert, that the whole empire contains 480 monasteries and 74 nunneries; the former including 7300 monks and the latter 5300 nuns; but these numbers are supposed to be exaggerated: Mr. Coxe states the nuns at only 1300, and this is said to be a just estimate. The monasteries all follow the rule of St. Basil. By the laws of Russia no ecclesiastic can be brought before a temporal judge, unless commissaries of the clerical order be likewise on the bench. For the honors of Russia, see BOORS.

Throughout the old provinces of Russia not any beggars are to be seen. The inferior class of nobility, which is the most numerous, live at their ease in the country. They are the true Russian farmers: their well-being depends on the progress of agriculture, and it prospers in their hands. The peasantry are very far from being unhappy. They are in general much more at their ease than the same order of men were in France, under the ancient government, when it was hardly possible for a carriage to stop, any where between Lyons and Paris for example, without being surrounded by a clamorous troop of beggars. Even the number of wealthy peasants is by no means inconsiderable; and it must every day become greater, so long as they retain their ancient simplicity of manners. Their savings necessarily accumulate under the form of capitals, and these capitals by degrees become productive; for many peasants have already abandoned agriculture, to engage in other branches of industry, as manufactures and trades, and even commerce. It is only in Finland and the Polish provinces that the peasants are poor.

The power of a state does not solely depend on the number of its inhabitants, but upon their wealth and activity. Russia, in this respect, has no reason to complain. She is sufficiently peopled for the actual state of her national riches. What would not this empire become, if its population was more concentrated!

The Russian language is an improved dialect of the Slavonian, which, with its characters, is still used in the offices of religion. According to M. Schlotzer, it is preferable to almost all the European languages. It is rich in words, soft, expressive, and requires great flexibility in the organs of utterance. It is, however, difficult of attainment by foreigners, on account of its innumerable peculiarities and anomalies. The Russian grammarians themselves are not agreed even concerning the number of letters contained in the alphabet. Some make it to be forty-one, and others thirty-one; whilst Rodde, with greater propriety in the opinion of Mr. Tooke, fixes the number at thirty-eight. Some of these letters are merely notes of accent in pronunciation.

Government of the Russian Empire.—As far as history reaches, Russia has always been an hereditary empire. The throne was occupied by Rurik and his descendants, according to the usual computation, from about the year 862 to 1598: and when Michael Feodor Romanow ascended the throne in 1613, a charter was executed confirming it to him and all his posterity, by which act Russia was in a formal manner declared a real hereditary empire. His accession to the throne was by unanimous election, “in a general assembly of the boyars and the other estates of the country,” and partly by his relationship to the tzarian family now extinct in the male lineage, and also in virtue of nomination, by which his father had already been heir to the throne. On a vacancy the heir takes possession of the throne, without any invitation or acts of homage. The oath of allegiance is usually administered to all classes of subjects, though the sovereign may dispense with it. The coronation has for many centuries been customary in Russia, and is still continued, on which occasion the sovereign, who puts the crown on himself, is anointed with holy oil. Since the introduction of Christianity, the sovereigns have always professed themselves of the orthodox Greek church. As to the title of the sovereign, we may observe, that Ivan Vassilievitch declared himself tzar in the year 1547, but it was expressly given to the sovereigns of Russia long before: this title in the Russian Bible signifies a king. In 1721 Peter I. assumed the appellation of emperor; and this imperial title has been borne ever since by the sovereigns of Russia. The abridged title, usual in ukases, sentences, commands, petitions, &c. is “emperor and autocrat, or empress and autocratrix, of all Russia, or of all the Russias.” It is beside our purpose to discuss the question concerning the ancient origin, or even existence of fundamental laws of the empire: it will be sufficient to remark, that all the present laws of this kind may be reduced to two principal classes, as they ascertain either the authority and prerogatives of the sovereign, or the claims of the subjects. Those that regard the sovereign comprehend the hereditary succession, the uncircumscribed authority, including all the great and exclusive prerogatives of majesty, and the principle that the sovereign is an imperial majesty and the dominion an empire: those that regard the subjects include specific obligations and rights, and they concern either the empire at large, or particular tribes, ranks, and classes; such are security of person, of reputation, of property, the non-denial of justice, legal protection against violence and oppression, unmolested enjoyment of all lawfully obtained immunities, privileges, and rights; the right, on the extinction of the reigning family, if no successor be appointed, to elect one, &c. Accordingly, the nobility may justly demand the quiet enjoyment of all the privileges and immunities granted to them by letters of grace. The burghers may appeal to the privileges granted to them in the regulations for townships. The Don Cos-

sacks, and other nations of that kind, may justly expect that no invasion be made on their districts and possessions, or any infringement of their rights, &c.

The legislative authority is vested solely in the monarch; neither the whole nation as a body, nor single members or classes of it, can claim any part of it. The sovereign is also the sole dispenser of all ranks and dignities; to the higher he himself appoints the persons, and signs with his own hand the instrument or patent. The inferior degrees are bestowed in his name by the proper commissioners or boards, *e. g.* in the civil department by the senate, in the military by the college of war, in the navy by the admiralty, in the church by the synod, in the medical department by the college of medicine, &c. Formerly there were several monopolies of the crown; but the late empress, to the manifest advantage of her subjects, abolished the greater part of them, reserving only two, *viz.* salt and brandy. As to landed property in general, it belongs either to the crown, or to private owners, and that again either to individuals, or in common to a whole tribe. Another prerogative that adheres to the throne is that the sovereign can appoint a regency during the minority of his successor, and fix the period of his arriving at majority. The form of government in Russia is unlimited monarchy; however, the free-born Russian subjects are always treated as such; and in general, it is permitted the subjects to utter their complaints and to make a representation of them. From several ukases it appears, that the next successor, his consort, and all their children, are styled grand dukes and grand duchesses, and that they all bear the title of imperial highness; that it is conferred upon them always by a signed decree of the monarch, and that, respecting the grand-daughters, the terms grand duchess and grand ducal prince are sometimes synonymous. The rights of the grand duke, as heir apparent, do not seem to have been accurately defined; he is the first subject, but he has properly no functions arising from his high birth and appointment, these depending on the good pleasure of the sovereign. The princes and princesses of the reigning family have no settled establishment; their household depending on the pleasure of the sovereign. The annual allowance to the grand duke, it is said, is usually 220,000 rubles, and sometimes more, to which are added many great presents.

The arms in the middle ages were borrowed from Moscow, at that time the imperial residence, and consisted of St. George on horseback, killing a dragon with a spear. Ivan Vassilievitch made choice of a black spread eagle, with a crown on each head, a larger crown between them, in a golden field, and holding in one claw a sceptre, and in the other an imperial mound, with the arms of Moscow on the breast. Sometimes it is surrounded with a collar composed of the arms of some of the countries belonging to the Russian empire, as Astrachan, Kazan, Siberia, &c. This is accordingly the imperial seal, and when the late empress used it for letters, it had an imperial mantle, and over it an imperial crown. The court is composed of the great officers of state, of senators, actual privy-counsellors, princes, counts, barons, &c. On court-days access is open to every subject. Six orders of knighthood form a part of the splendour of the court, with their peculiar insignia. The first three were constituted by Peter I.; the two next by the late empress Catharine II., and the sixth proceeds from Sleswick-Holstein. Of the former five the monarch is always grand-master; but of the sixth, the grand duke, as duke of Sleswick-Holstein. To the fourth and fifth, pensions are annexed to a select number of the eldest knights. These orders take precedence according to the seniority of their

their institution. They are as follow, St. Andrew, St. Catharine, St. Alexander Neffsky, St. George, Vladimir, St. Anne of Holstein. See each respectively.

Of the imperial colleges, instituted for the government of the Russian empire, our limits will allow our mention only of the two principal and supreme, *viz.* the "Directing Senate," and the "Holy Synod." The former was constituted by Peter I., who raised it to the rank of the supreme or highest college of the empire. In 1763 the late empress remodelled it, causing it to consist of six departments, four at Petersburg and two at Moscow. This supreme imperial college, styled by the empress the sanctuary of the laws, can issue orders to any other imperial college, and receive reports from them (the synod excepted), it publishes the laws and edicts received from the monarch, and provides for their execution; returns a decisive answer to the questions sent in by the courts or governors in doubtful cases; appoints to many considerable posts in the viceroalties; advances, in the name of the sovereign, meritorious civil officers to higher rank, and is the highest tribunal to which appeal can be made, for none can either appeal from its decrees nor complain of them; but any one who is dissatisfied with its sentence has no other resource than to present his petition to the cabinet. The second supreme college is the "Holy Directing Synod," which is the highest spiritual court of the Russo-Greek church. In 1789 this college consisted of one metropolitan, one archbishop, one bishop, one proto-pope (the imperial confessor), one archimandrite, one proto-pope (of the seculars), one upper procureur, one chief secretary, one executor, three secretaries, one protocolist, and one staff-surgeon; the absent members were one metropolitan, two archbishops, and one bishop. At the synodal comptoir at Moscow, at that time, were one metropolitan, one arch-priest of the secular clergy, one procureur, and one secretary. In the spiritual commission, one metropolitan, one archbishop, one privy-counsellor, and one secretary, have their seats. Under the authority of the synod are all prelates, consistories, ecclesiastics, churches, religious books, &c. For the other subordinate imperial colleges, we refer to Mr. Tooke's account of them; as well as for other particulars relating to the laws, the constitution of the Russian government, and the condition of the Russian subjects. On this latter topic we shall select and subjoin a few particulars.

The nobleman, generally speaking, pays no tax for any part of his land which he occupies himself, nor even for his moveable property. If he possesses no male vassals, his fields, forests, mines, mills, fisheries, &c. which he occupies with free or hired labourers, are as exempt from taxation as his person; but, on the other hand, the nobleman who has vassals must furnish recruits out of them. The clergy, in regard to their persons, are likewise exempt from taxes. Their stipends, which consist in money, and in the country of corn and pieces of land, are raised by them free of all deductions. Placemen, and officers of the crown, &c. pay no annual tax on their salaries. Literary men, who are not enrolled in any guild, and who, besides their learned profession, as physicians, lawyers, &c. are not engaged in trade, are entirely exempt from taxes; and this is also the case with artists, &c. People who live solely on the interest of their capital, and do not inscribe themselves in any guild, however large their income may be, pay no tax upon it whatever. All inhabitants of towns possess their immoveable property free of all taxation. As for the great body of the yeomanry or country-folk, their real necessaries are subject to no taxes, because in all Russia there is no such thing as excise; and in general the taxes are not oppressive. That

both the nobility and burghers live in affluence is manifest from the luxury that every where prevails. The Russian boor, even the vassal of the nobleman, lives very decently in his house, has a sufficiency of wholesome food, is neatly dressed, puts commonly two or three dishes on his table, and even accumulates a trifling capital, though, as it is not secured to him, and may be taken from him, he frequently buries it in the ground. In some villages the boors display even an opulence. Among the very numerous nobility many possess fortunes of 100,000 or 500,000 rubles, and sometimes more; and the generality may have a fortune of between 30,000 and 100,000 rubles. In no country are the learned professions so well provided for as in some provinces of Russia, particularly Livonia and Esthonia. The preacher, even in the smallest country-pastorate, lives on a footing no less brilliant than the general superintendant in many of the provinces of Germany. Although his stipend is small, yet his presents for the discharge of his official duties from noblemen and burghers are numerous and large. His daily table is supplied with several dishes; he has men servants and maid servants; he is commonly the friend and confidant of the noblemen of his parish, and his house is the place of their usual resort. The case is similar with regard to law-advocates, physicians, surgeons, and private tutors. On account of the flourishing state of commerce in the maritime towns, there are many merchants who possess capitals of some hundred thousands of rubles. The condition of the boors is far from being contemptible and wretched. The Cossacks generally enjoy not only the necessaries but the accommodations and comforts of life. In the parts about the Don, ease and affluence are every where seen; and the Cossacks of the Ural pass their time in idleness and yet in plenty from the riches obtained by means of the productive fisheries on that river. Upon the whole, the writer now cited observes, that the moderate taxes, the cheap living, the excellent and numerous products, the contentedness of the people, and the good regulations adopted through the empire, afford to every one who conducts himself well in his state of life, sufficient means for acquiring a competency. The majority of the Russian subjects fare better in their way than the great multitudes in France, Germany, Sweden, and several other countries.

The social state of the inhabitants of the Russian empire is capable of great melioration, and productive of much actual comfort, from the opportunities that are afforded them for active and industrious exertions. The objects of the *chace*, in the most northern and eastern parts of Russia, and particularly on the islands between Kamtschatka and America, and also in the governments of Tobolsk, Perm, Ufa, Viætka, Archangel, Olonetz, Vologda, and some others, afford both an amusing and lucrative employment. The *chace*, for the sake of furs, is of primary importance in its relation to foreign commerce. The most valuable of all the animals that are sought for their skin is the "sable," the skin serving as a standard to the tribute, which is paid to the crown by the Siberian nation of hunters. This animal is found in Asiatic Russia, from the Alentan islands and from Kamtschatka to the districts of the Petschera and of the Kama. The finest sables come from Yakutsk and Nertschinsk; and among these are likewise, though rarely, yellow, and very seldom, white sables. The Kamtschatka sables are the largest of all. As the sable is become scarce, the crown accepts of the skins of foxes, martens, squirrels, and fish-otters, from the inhabitants of Siberia, instead of the sable. Eastern Siberia, and particularly Kamtschatka, abound most in beautiful foxes. To the other objects of *chace* for the furs, we must add the bear, the wolf, the lynx,

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the *glutton*, the *ferret*, the *pole-cat*, &c. which, generally speaking, are spread over the whole of North Russia; and vast quantities of their skins are either consumed at home or sent abroad. But we have not room to enumerate all the animals that are profitable objects of chase to the Russians. We shall observe in general, that peltry of all kinds may be considered as a remarkable and lucrative product of the Russian empire. The principal species are: *sables*, *beavers*, *blue and white foxes*, *wolves*, *hyænas*, *lynxes*, *ermine*, *pestzui* or *muscovite dogs*, *squirrels*, *martens*, *hares*, *sheep*, *wild cats*, *panthers*, *tigers*, and *bears*. The Russians have the art of dyeing the furs so ingeniously, that the Chinese, and therefore others who are not good judges, are easily cheated.

Beavers are chiefly found in Kamtschatka; they are principally used in trimming the caps and pelisses of women of quality.

Foxes are every where met with in Russia proper, in the conquered provinces, and in Siberia. Those of Siberia are the best. Besides the common cross-blue fox, they have very dark, called black, and even white foxes, which last, however, are extremely rare, and, like the black, fetch a higher price than sables. The ermine is a sort of rat, and is employed for trimming pelisses. All minever is squirrel-skin. The Siberian is incomparably darker, thicker, and more lasting, and accordingly much dearer than the ordinary Russian. The Russian hare-skin is of the hare peculiar to this country, which in winter becomes white. The ruffaki cannot be used as fur, as they never change their colour. Common coarse sheep-skin affords a warm and durable pelisse for the lower order of people; the finer is worn even by persons of distinction. The Kalmuck and Bucharian sheep-furs are rather scarce and dear, still more so are the Kalmuck furs of unborn lambs. The genuine Bucharian sheep-skins are watered, and the Kalmuckian by nature crisp and curly. But here likewise great frauds are practised, as the Russians frequently curl the fine skins of the common sort, in order to impose upon the unwary.

Bear-skins and tiger-skins are used only for covers to sledges, and trappings for horses, or, instead of beds, for servants to lie on. Boots are lined with the ordinary Russian cat-skin; but the blue Siberian cats yield a very beautiful fur.

All these skins are sold either by the piece or sackwise. Two hundred skins of Russian, and a hundred skins of Siberian minever, compose a sack, and two hundred hare-skins are also reckoned a sack. The Russians are singularly industrious and ingenious in assorting their furs. Of one sort of skin they make several descriptions of furs; as, for example, a particular fur is prepared of the small dark stripe on the backs of squirrels, another of the sides, again another of the bellies; and in like manner with the skins of other animals.

Besides the chase, which has always been the exclusive occupation of particular nations of the Russian empire, there are also tribes who maintain themselves principally or wholly by the *fishery*, and with whom even the establishment of this trade forms a part of their civil constitution. Some follow it for their own support, while others, as the Cossacks of the Don and the Ural, and the tribes on the shores of the Volga, carry on a lucrative traffic with the products of their fishery. The Frozen ocean, together with its bays and rivers, affords various species of sea-animals, that are fought after by several nations. To the inhabitants of the governments of Archangel and Olonetz the islands of Spitzbergen and Novaya Zemlia afford the chief scene of fishery at the proper season. The animals that principally engage their attention are whales and morfes. Accordingly, every year a ship goes

from Archangel to winter at Spitzbergen, and at least one, frequently more, to Novaya Zemlia. The inhabitants of Mese navigate these coasts only in summer. From the morse fishery the chief commercial products are the blubber and the skin; the blubber for its oil, and the skins, when dried, for horse traces, and when cut, as size for the paper-manufactories. The teeth of the morse likewise are transported to Petersburg, Mese, and Archangel, and are wrought up into the various works for which ivory can be used. The Frozen ocean also teems with the narwhal, the pott-fish, from whose brain spermaceti is prepared, the sea-dog, dolphin, sea-hog (delphinus phocæna), hay-fish (squalus carcharias), sea-cow (trichecus manatus), the sea-bear (phoca urfina), the sea-lion (phoca leonina jubata), the sea-otter (lutra marina), and many others, which are caught either for their skin or their blubber. Among the principal objects of the fishery on the coasts of the White sea, which skirt the government of Archangel, are the cod, the navaga (gadus callarias), plaice, soals, stock-fish, and herrings. The Dvina and the Petschora abound in that excellent fish called by the Russians *fighi* and *salmons*, the latter being reckoned the fattest and best flavoured of all Northern Russia, and they are therefore frozen or salted, in order to be transported to a great distance round the country. The Oby also affords an ample supply of sturgeons, sterlet, white salmon, pikes, *muræna*, quobbe or quappe (gadus lota), and a multitude of other fish. The Oby fishery is chiefly carried on by Ostiaks and Samoyedes. The Irtschik also contains almost all the fish that are found in the Oby; and here the fishery is very considerable. The Yenissei and Lena, and most of the rivers that fall into them, furnish great variety and abundance of fish. The whale fishery we shall have occasion to mention under another article. The Eastern ocean furnishes, besides the whale, the sea-bear, sea-lion, sea-cow, and sea-otter, which we shall elsewhere describe. In a commercial view, there is not any of these marine animals so important as the sea-otter, the beautiful fur of which is in high estimation. See FUR.

The fishery on the Caspian, as Pallas observes, is in some respects as important to Russia, as the herring, the cod, and the whale fishery to other maritime powers of Europe. Of the fish of the Volga, the several kinds of sturgeon and the white salmon are the best. The Kamma, which falls into the Volga, also abounds with fish, which is held to be the best flavoured of any in Russia, at least its sturgeon, sterlet, and white salmon, are preferable to those of the Volga. Besides these three kinds, a principal fish of the Kamma is a small salmon called in Russ *krafnaya reba*, red or beautiful fish (*salmo eriox*, or *salmo alpinus*). For an account of the means for catching fish on the Volga, and on the confines of Astrachan, see UTSCHING. The fishery on the Ural is not less considerable than that of the Volga; and being under good regulation, it forms the principal support and occupation of the Uralian Cossacks. See URAL.

The fishery of the Euxine and the sea of Azof, though neither so important nor extensive as that of the Caspian, affords numerous sorts of sturgeon. The whole northern coast of the sea of Azof, from the Don to Perekop, is laid out in fisheries, for which these districts are extremely favourable. The most considerable fisheries on the peninsula of Taurida are at Kertsh and Yenicaly, where the capture usually begins in May, and continues till some time in October. On the coasts of the Baltic, also, a considerable fishery is carried on. The gulfs of Riga and of Finland contain generally the same kinds of fish. In the waters of Livonia, says a naturalist of that country, are forty-nine different species of fish, among which the salmon, streamlings, pike, and lampreys,

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preys, for exportation if not for home consumption, are the most important. One species of fish peculiar to these waters is the kyllo streamling, caught in great numbers in autumn, near Revel and Roggervyk. They are pickled, and form a good substitute for anchovies and fardelles, and thus prepared, they are sent abroad to various parts. The potted lampreys from Narva are no less exquisite. The greatest store of the gulf of Finland consists of sterlets, salmon, and carp. Sturgeon are found in the gulf of Cronstadt, and likewise at times in the Neva. In winter, the transport of frozen fish from the remoter parts of the empire to St. Petersburg is very considerable. In Russia there are several lakes that afford an abundant supply of fish. The chief of these is the *Baikal*, which sec. The Tschan, a Siberian lake, is particularly prolific in fish; and in this respect among the European lakes the Ladoga is the most remarkable. The Peipus and the Ilmen also yield a great variety of fish, and the smaller European lakes are proportionally productive. According to the calculations of Hermann, the whole value of the fishery in one year, may be estimated at 15,000,000 of rubles.

Another branch of productive industry in the Russian empire is the *breeding of cattle*. The nations of herdsmen in this empire are the Kirghises, the Kalmucks, the Bashkirs, the Burats, and several others less numerous: the breeding of cattle is a principal trade with the Cossacks of the Don, the Nogayans, the Barabinses, and some others; with most of the nations of hunters it is a considerable means of profit, and as a profitable branch of trade it flourishes in many districts of proper Russia. The breeding of cattle affords to the inhabitants many, and in some districts all the means of subsistence, and yields besides to commerce a multitude of articles for exportation. Two of these are hides and tallow: of the latter, in the year 1793, 1,035,000 poods were exported; and the value of that quantity amounted to 4,279,000 rubles, not including the tallow candles, the exportation of which amounted in value to 170,000 rubles. Yufts and leather were in the same year shipped off to the amount of 2,249,000 rubles, and the other exports in the products arising from the breeding of horned cattle, made a sum of more than 163,000 rubles. The whole value of all these articles in one year was upwards of 6,862,000 rubles. The breeding of sheep is also an article of importance in the Russian empire. The Nomades are richer in sheep than in any other article, and even the boors and Cossacks in Southern Russia and Siberia possess flocks of hundreds and thousands. Through the whole country this branch of productive industry might be very much improved. Goats and hogs are also animals that yield to the Russian empire considerable profit, and with due attention might be rendered much more lucrative. Hog's bristles constitute an important article of exportation; in the year 1793, these, to the value of 742,000 rubles, were shipped off. The horse, the ass, the camel, the rein-deer, and the dog, are animals which are capable of being rendered profitable to this country in a much greater degree than they now are; though at present they are not unworthy of attention.

Another branch of productive industry in the Russian empire is *agriculture*. In Russia, agriculture is less the business of the peasantry than in other countries. Throughout the empire every village has its proper territory, and every estate its allotted inclosures and commons. In Siberia every man takes as much ground from the open steppes as he can manage; and when such a portion of ground is exhausted, he proceeds to another, &c. so that these little slips of land lie scattered at twenty, fifty, and even eighty versts distance from the village. In Russia and Siberia they cultivate win-

ter rye and summer rye, winter wheat only in Russia as far as the Kama, summer wheat both in Russia and Siberia; barley, spelt-barley, or bear-barley plentifully in Russia; oats in Russia and Siberia; few pease, and still fewer vetches and beans; a great deal of buck-wheat; in Siberia, Tartarian buck-wheat, millet, and the grain called panicum germanicum, only in Russia. The villagers have hay-fields on the banks of lakes and rivers, in brakes and fens of the forests. The old withered grass, weeds, twigs, and light stuff they set on fire, and this occasions an appearance which at night is tremendous. Besides corn, they grow flax in large quantities, chiefly on the Volga, but most of all in the government of Yaroslaf, and also in the governments of Moscow and Kazan. Hemp is indigenous in all the south and middle of Russia and Siberia, and is propagated in great abundance, both for the material of linen, sail-cloth, &c. and for the oil expressed from its seed, of which a very great quantity is consumed for food during the fasts, and which, as well as the hemp, is exported annually to a great amount. Wood likewise grows wild in Southern Russia and Siberia; it is gathered in the Ukraine, and employed in staining and dyeing. It is also cultivated in the government of Penza, and about the Don. Tobacco is planted almost solely, but in great abundance, in the Ukraine. Hops are propagated by the villagers only, in small quantities, in the governments of Kazan, Nishnei-Novgorod, &c.; and in Siberia, in the province of Irkutsk, the wild sort is plentiful. Orchards are of little account, except in the chief towns. No fruit-trees thrive in Siberia. Water-melons are much cultivated in the south-eastern parts of Russia, from the Don to the Ural, especially on the Volga. In the breeding of cattle, the countryman is directed by climate and pasturage. In the south of Siberia a person often possesses 300 horses, as many sheep, about half the number of horned cattle, always a few swine, and much poultry, sometimes geese and ducks. The Russian horses are of a middling size, with large heads, long flabby ears, not very handsome, but spirited, strong, and hardy. The horned cattle are small and brisk: the cows give little milk, which is poor and thin. In Little Russia the oxen are used for draught. About Archangel there is a fine breed of large cows, originally brought from Holland, and they do not degenerate. The true Russian sheep are distinguished from the common sort by a short tail, about the length of seven inches. Hogs, dogs, and cats are of the ordinary kinds. The poultry are housed all the winter in the cottage, under the hearth and the sleeping benches, for the sake of having Easter eggs. The culture of bees is the principal concern of the Bashkirs in the Ural, and is also an object of attention in Southern Russia. In the northern districts of Russia and Siberia the chase is pursued as a trade, particularly for those animals whose skins are used as furs, especially sables and grey squirrels, for the wear of the Russian gentry in town and country. The carrier's trade is a source of great profit. The towns at the distance of from 500 to 1000 versts, serve as stations for changing the drivers and carriages, *e. g.* from Kiachta, Irkutsk, Krasnoiarisk, Tomsk, Tara, Ekaterinenburg, &c. The country market-towns and hamlets are commonly open, and mostly built in irregular streets, with little kitchen-gardens and large yards to the houses; they are situated on the banks of rivers, for the convenience of obtaining water. They contain many churches; and the monasteries in or near them, from their strong walls, massy gates, and numerous church towers, have the appearance of castles. The fortresses dispersed about the country have seldom earth-ramparts, but are mostly built like their houses, with a low palisade round them. The cannons stand on the gates and on the angles of the ramparts,

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or batteries on wooden carriages. These are designed to keep the tributary tribes in awe, and the neighbouring Nomades from the borders. Ostrogs, or houses surrounded with a palisade of upright pointed banks, are situated either in towns, where they serve as prisons for criminals, or solitarily, in various parts of the country, for the same purposes as the fortresses. The parishes, or church villages, are sometimes very extensive; containing 500 or even 1000 and more farms, and from three to seven churches, many of them brick buildings, markets, and trafficking places. Large villages are frequently called slobodes, but many slobodes are less than church villages; the houses are ranged in straight streets, and the streets mostly laid with timbers.

Of the nations, says Mr. Tooke, who have followed agriculture from time immemorial, though in various ways, and with different success, the principal are the Russians, the Poles, the Lithuanians, the Lettes, the Finns, and Esthonians. The state of agriculture in all countries must depend on the nature of the soil and climate, as well as on the industry of the inhabitants. With this view of Russia, the most northern and eastern districts of the empire, of the former, particularly in Siberia, are totally unfit for every kind of economical culture. The 60th degree of latitude may be regarded as the boundary beyond which no agriculture is practicable. The repeated attempts that have been made about Okhotsk (between 59° and 60° N. lat. and 160° E. long.), and Udskoy-ostrog (55° 20' N. lat. and 150° 40' E. long.), in the government of Irkutsk, shew, that the culture of corn will never be introduced to effect; and even in Kamtschatka, where the southernmost cape runs out to 51° N. lat. similar trials have been made with very poor and precarious effects. Admitting, therefore, the 60th degree of latitude to be the general boundary of the soil susceptible of culture to the north, we may infer, that the Russian empire contains about 162,000 square geographical miles of land totally unserviceable to the purposes of agriculture. Accordingly the circles in the governments of Olonetz and Archangel have no agriculture, and even in some districts of Vyborg, St. Petersburg, Novgorod, Vologda, Perm, and Viätka, it is attended with almost insuperable, or at least deterring difficulties. In some also of the southern districts of Caucasus, Saratof, Ufa, Kolyvan, Ekaterinoslaf, and Taurida, the soil is so poor, that the natural impediments can perhaps never be entirely surmounted. To the fertile regions belong most of the governments of the middle, and several of the northern tracts; but the best and most productive soils are chiefly found in Little Russia, Kazan, Simbirsk, Kharkof, Kursk, Orel, Nishnei-Novgorod, in the southern part of Taurida and Caucasus, in the newly-acquired portion of the Polish Ukraine, and particularly also in some of the Siberian provinces. The great fertility of the districts bordering on the Volga, the Kama, the Dnieper, the Terek, and the parts about the Euxine, has been long experienced. Moreover, in the territory of Krasnoiarisk, a circle-town of the government of Kolyvan, between the 55th and 56th degrees of N. lat., the fertility of the soil is such, that no instance has occurred of a general failure, and that it is a very ordinary harvest, when the summer rye yields 10-fold, the winter corn 8-fold, and the barley 12-fold. It is usual for the wheat only in bad years to yield the sixth grain, and the oats give an increase rarely short of 20-fold. In consequence of this exuberance, provisions are here in great plenty, and probably in no province of the empire at so low a price. When Pallas was at Krasnoiarisk, a pood of rye-meal fold for 2 or 3, and a pood of wheaten flour for 4½ or 5 kopecks; a whole ox was bought for 1½ ruble, a cow

for a ruble, and a good serviceable horse for 2 or 3 rubles at most; sheep and hogs fetched from 30 to 50 kopecks a-piece. And though in 25 years that have elapsed since that period an alteration has taken place, yet this country is still one of the cheapest, as well as one of the richest and most plentiful of all.

The implements of husbandry, without which no great progress in the culture of the soil can be expected, are the most simple and artless that can be well imagined.

In such a state, and with such instruments, we need not wonder that agriculture is negligently and badly conducted, and yet we may well be surpris'd, that the country so managed should yield so considerable a produce; the bounty of nature supplying the work of skill in most of the provinces of middle and southern Russia. Moreover, in the provinces lying in the Baltic, in the White-Russian governments, in the Polish Ukraine, and even in proper Russia, on the estates of noblemen who carry on the farming business with some degree of care, much greater pains are bestowed, and in general more ingenious implements are used. It would lead us too far to give an account of the practice of husbandry either in the northern or southern provinces of Russia; yet, in spite of all the defects of Russian agriculture, its products are so numerous and important, that they not only supply the home consumption, but constitute by far the most considerable article of exportation. The corn most generally cultivated in Russia, and in those tracts of land that do not lie farther north than the 60th degree of latitude, is rye: wheat is more cultivated in the middle and southern governments; in the government of Ekaterinoslaf is cultivated the "Arnautan" wheat, which yields a yellowish flour, and which produces in good years 15 corns above the sowing. Turkish wheat, or maize, is raised on the confines of the Terek and in Taurida. Barley is also a considerable produce of governments in which wheat succeeds, and oats also are cultivated for the consumption of the people in meal for porridge.

Of the four kinds of corn now enumerated, Russia annually exports a considerable quantity, especially from the Livonian ports. The Livonian corn is said to keep longer than that of other countries, not to need such frequent turning, and likewise to yield more flour. In 1793 these exports amounted, in corn and meal, to the value in wheat, of 1,490,000; in rye, of 1,379,000; in barley, of 236,000; and in oats, of 17,000 rubles. The other corns cultivated for home consumption, but not for exportation, are millet, spelt or bear-barley, buck-wheat, manna, or testuca fluitans, growing almost every where in Russia, on meadow-grounds that are overflowed, particularly in the governments of Riga, Pskove, Polotsk, Novgorod, Tver, Smolensk, &c. and rice. Potatoes are cultivated only in a few governments, and chiefly among foreign colonists. Grasses, and fodder of all kinds, every where abound in the Russian empire; and vegetables, for the use of manufactures and commerce, are very abundant, such as hemp, of the produce of which the export, in 1793, amounted to upwards of 8,808,000 rubles; without including the hemp-oil. Flax of the best kind, and most in quantity, is cultivated in the governments of Vologda, Pskove, Novgorod, Riga, Mohilef, Tver, Polotsk, Viätka, the confines of the middle Volga, and in the parts about the Oka and Kama. Both the common and the Siberian flax are often found wild, the former in the steppes, about the northern Ural, the latter on the shores of the Volga, near Tzaritzin, and in other places. Among the plants growing wild, and yielding fibres like flax or hemp, is also the common and the Siberian stinging-nettle (*urtica dioica* and *cannabina*), which are found plentiful on the Uralian mountains.

mountains. The Bashkirs, the Koibals, the Sagayan Tartars, &c. prepare yarn and weave linen of them. Of flax, in seeds and other products, exclusively of the oil, the exportation in 1793 amounted to 7,220,000 rubles. Cotton has hitherto been little cultivated; some attempts have been made about Astrachan and Kitzliar, on the Terek; but there are other climates and soils that would suit it. Some wild-growing silk-plants, yielding a material similar to cotton, known among botanists by the name of "cynanchum acutum," and "apocynum maritimum," grow wild in the worst soils, and might be cultivated and manufactured to advantage. There are also other plants of a similar kind that might become objects of profitable attention. Russia also furnishes a variety of plants that would afford, if duly regarded, abundance of dyeing materials; such as madder, which grows wild on the banks of the Oka, near Riazan and Arfamas, on the borders of the Volga, in the confines of Syfran and Saratof, and in great quantities, and of superior quality, about the Samara, in Taurida, on the Terek, and in several districts of the government of Caucasus; woad (*isatis tinctoria*), and a variety of it (*isatis lusitanica*), which are seen wild in several of the southern governments; saffron, which grows wild about the Terek, in the governments of Voronetch and Ekaterinofslaf, in Taurida, and especially in the Caucasian mountains, around Mosdok; and safflower (*carthamus tinctorius*), which thrives perfectly well in the gardens at Toropetz, Moscow, Tzaritzin, Poltava, and other places. Among the vegetables for fabrication and trade, we might enumerate hops and tobacco; the former grows wild in most districts of Russia and Siberia, and the latter is cultivated in the Malo-Russian governments, and also about the Volga and the Samara, and particularly by the Cossacks on the Orenburg and Siberian lines.

In 1793 the exportation from Russia of hemp-oil and flax-oil exceeded in value 697,000 rubles.

Of medicinal plants of all kinds, Russia possesses a great store; such are the rhubarb (*rheum compactum*), and the rhapontic, or Siberian rhubarb (*rheum undulatum*). *Saxifraga* (*saxifraga crassifolia*) grows abundantly in the southern and lofty snow-mountains of Kolyvan; and the polypodium fragrans, a beautiful and odoriferous fern, is gathered by the Burzets on the summits of rocks, and is taken as a wholesome tea against scorbutic and colicky complaints. The culinary vegetables that are cultivated in Russia are so numerous and various, that it is needless to mention them. Besides those shrubs and berries known to us, such as raspberries, currants, strawberries, which grow in surprising quantities, gooseberries, &c. Russia produces in great abundance several which are here very rarely or never seen. Of these, for instance, are the berries called *pianitza*. In appearance they are much like the bilberry, but have a very different, exceedingly agreeable taste, and intoxicating if taken in quantities. Hence it is they have their appellation, from *pian*, drunk. Mushrooms are found in great plenty, and are very generally eaten, excepting the champignon, which, for what reason it is not easy to discover, is carefully avoided by the common people. Of the Russian mushrooms, the *rishchicki* or *ritzgen* are most famous. This sort of mushroom is likewise found in Courland and Prussia. Their name, *rishchicki*, is derived from their reddish-yellow hue; and they are eaten either raw, boiled or broiled, or pickled. We shall further select some other vegetables that have engaged more than ordinary attention: such as asparagus, which in the government of Moscow, and some others, is made an article of trade; such are berries of various kinds, some of which are peculiar to the north of Russia, as well as to the whole of Siberia; the hazle-bush, found over all Russia as far as the

Kamma, and so plentiful in the regions between Simbirsk and Kazan, as to give rise to a branch of considerable trade, as a great part of Russia and all Siberia are hence supplied with a sweet-meat in very general use, eaten in the fats with nut-oil; sugar-melons and water-melons, which thrive in the open air to the 52d degree of latitude; the common orchard fruits, which succeed every where in the middle and southern parts of Russia. Of all the species of fruit produced in the Russian empire, apples and pears are the most abundant. All the villages on the Oka and Volga have their orchards, or more properly apple-gardens, so that many boors live here without husbandry, merely by horticulture, in good circumstances. Cherries are very frequently produced in orchards, but in Southern Russia there are even whole forests of cherry-trees. Apricots and peaches succeed in most parts of Taurida and Caucasus, and in the southern circles of Kief, Ekaterinofslaf, Vofnesensk, and some other governments, without much attention. The quince-tree grows wild and plentifully in the forests about the Terek: chestnut-trees are only found singly in Taurida, Kief, and Voronetch: walnut-trees are seen in most districts of Southern Russia, and in great abundance; but the almond-tree grows only in the provinces that lie most to the south: figs and pomegranate-trees are seen singly near Kitzliar and in Taurida; but lemons and orange-trees are every where raised only in hot-houses, though Pallas assures us, that they would very well bear the winter in Taurida with more attention. The culture of the vine is at present carried on in the governments of Caucasus, Taurida, Ekaterinofslaf, and Vofnesensk, and the country of the Don Cossacks. The whole region of the Russian empire, from the southernmost borders to the 48th degree of latitude, constitutes a superficies of more than 12,000 square geographical miles; but of this large tract, scarcely one-fourth part is proper for the culture of the vine.

The forests of Russia amount to a superfluous abundance in the governments of Archangel, Olonetz, Tobolsk, and Irkutsk: the governments of Perm, Kazan, Simolensk, Mohilef, Minsk, Tchernigof, Voronetch, Ufa, Tula, Simbirsk, Orel, Kaluga, &c. are richly furnished with them, not only supplying most of the forges and metal founderies, but also sending excellent ship-timber to the yards. Most of the other provinces have a sufficiency for their own consumption; but some few of the southern governments, as Kief, Kharkof, Kursk, Ekaterinofslaf, and Taurida, are but scantily provided. Of trees, those that have narrow-pointed leaves are chiefly indigenous in Northern Russia, forming forests of prodigious extent, among which the fir, the pine, and the black pine, are the most common and most widely diffused. The Siberian cedar (*pinus cembra*) is found particularly in the Uralian mountains; the larch-tree grows in the north of European Russia, and in most of the Siberian mountains. Among the umbrageous trees the birch is the most common, and its bark and wood are applied to various purposes. Next to the birch is the linden, from which Russia derives great advantage. The oak is indigenous only in the European part: it is most frequently found in the governments of Kazan and Voronetch, where it is chiefly employed in ship-building; but also in Little and White Russia it forms considerable forests. The ash and the willow grow almost every where: but beech, elms, the maple, and the poplar, are chiefly the growth of the southern regions. The forests supply an extraordinary number of products for home consumption, and also very considerable articles of export. In 1793 the value of the latter in specie amounted to upwards of 2½ millions of rubles, when Russia shipped off to the value of 1,744,000 rubles in masts, balks, and deals; 394,000 in pot-ashes and

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or batteries on wooden carriages. These are designed to keep the tributary tribes in awe, and the neighbouring Nomades from the borders. Ostrogs, or houses surrounded with a palisade of upright pointed banks, are situated either in towns, where they serve as prisons for criminals, or solitarily, in various parts of the country, for the same purposes as the fortresses. The parishes, or church villages, are sometimes very extensive; containing 500 or even 1000 and more farms, and from three to seven churches, many of them brick buildings, markets, and trafficking places. Large villages are frequently called slobodes, but many slobodes are less than church villages; the houses are ranged in straight streets, and the streets mostly laid with timbers.

Of the nations, says Mr. Tooke, who have followed agriculture from time immemorial, though in various ways, and with different success, the principal are the Russians, the Poles, the Lithuanians, the Lettes, the Finns, and Esthonians. The state of agriculture in all countries must depend on the nature of the soil and climate, as well as on the industry of the inhabitants. With this view of Russia, the most northern and eastern districts of the empire, of the former, particularly in Siberia, are totally unfit for every kind of economical culture. The 60th degree of latitude may be regarded as the boundary beyond which no agriculture is practicable. The repeated attempts that have been made about Okhotsk (between 59° and 60° N. lat. and 160° E. long.), and Udskoy-ostrog (55° 20' N. lat. and 150° 40' E. long.), in the government of Irkutsk, shew, that the culture of corn will never be introduced to effect; and even in Kamtschatka, where the southernmost cape runs out to 51° N. lat. similar trials have been made with very poor and precarious effects. Admitting, therefore, the 60th degree of latitude to be the general boundary of the soil susceptible of culture to the north, we may infer, that the Russian empire contains about 162,000 square geographical miles of land totally unserviceable to the purposes of agriculture. Accordingly the circles in the governments of Olonetz and Archangel have no agriculture, and even in some districts of Vyborg, St. Petersburg, Novgorod, Vologda, Perm, and Viætka, it is attended with almost insuperable, or at least deterring difficulties. In some also of the southern districts of Caucasus, Saratof, Ufa, Kolyvan, Ekaterinoslaf, and Taurida, the soil is so poor, that the natural impediments can perhaps never be entirely surmounted. To the fertile regions belong most of the governments of the middle, and several of the northern tracts; but the best and most productive soils are chiefly found in Little Russia, Kazan, Simbirsk, Kharkof, Kurfk, Orel, Nishnei-Novgorod, in the southern part of Taurida and Caucasus, in the newly-acquired portion of the Polish Ukraine, and particularly also in some of the Siberian provinces. The great fertility of the districts bordering on the Volga, the Kama, the Dnieper, the Terek, and the parts about the Euxine, has been long experienced. Moreover, in the territory of Krafnoiarsk, a circle-town of the government of Kolyvan, between the 55th and 56th degrees of N. lat., the fertility of the soil is such, that no instance has occurred of a general failure, and that it is a very ordinary harvest, when the summer rye yields 10-fold, the winter corn 8-fold, and the barley 12-fold. It is usual for the wheat only in bad years to yield the sixth grain, and the oats give an increase rarely short of 20-fold. In consequence of this exuberance, provisions are here in great plenty, and probably in no province of the empire at so low a price. When Pallas was at Krafnoiarsk, a pood of rye-meal fold for 2 or 3, and a pood of wheaten flour for 4½ or 5 kopeeks; a whole ox was bought for 1½ ruble, a cow

for a ruble, and a good serviceable horse for 2 or 3 rubles at most; sheep and hogs fetched from 30 to 50 kopeeks a-piece. And though in 25 years that have elapsed since that period an alteration has taken place, yet this country is still one of the cheapest, as well as one of the richest and most plentiful of all.

The implements of husbandry, without which no great progress in the culture of the soil can be expected, are the most simple and artless that can be well imagined.

In such a state, and with such instruments, we need not wonder that agriculture is negligently and badly conducted, and yet we may well be surpris'd, that the country so managed should yield so considerable a produce; the bounty of nature supplying the work of skill in most of the provinces of middle and southern Russia. Moreover, in the provinces lying in the Baltic, in the White-Russian governments, in the Polish Ukraine, and even in proper Russia, on the estates of noblemen who carry on the farming business with some degree of care, much greater pains are bestowed, and in general more ingenious implements are used. It would lead us too far to give an account of the practice of husbandry either in the northern or southern provinces of Russia; yet, in spite of all the defects of Russian agriculture, its products are so numerous and important, that they not only supply the home consumption, but constitute by far the most considerable article of exportation. The corn most generally cultivated in Russia, and in those tracts of land that do not lie farther north than the 60th degree of latitude, is rye: wheat is more cultivated in the middle and southern governments; in the government of Ekaterinoslaf is cultivated the "Arnautan" wheat, which yields a yellowish flour, and which produces in good years 15 corns above the sowing. Turkish wheat, or maize, is raised on the confines of the Terek and in Taurida. Barley is also a considerable produce of governments in which wheat succeeds, and oats also are cultivated for the consumption of the people in meal for porridge.

Of the four kinds of corn now enumerated, Russia annually exports a considerable quantity, especially from the Livonian ports. The Livonian corn is said to keep longer than that of other countries, not to need such frequent turning, and likewise to yield more flour. In 1793 these exports amounted, in corn and meal, to the value in wheat, of 1,490,000; in rye, of 1,379,000; in barley, of 236,000; and in oats, of 17,000 rubles. The other corns cultivated for home consumption, but not for exportation, are millet, spelt or bear-barley, buck-wheat, manna, or testuca fluitans, growing almost every where in Russia, on meadow-grounds that are overflowed, particularly in the governments of Riga, Pscove, Polotsk, Novgorod, Tver, Smolensk, &c. and rice. Potatoes are cultivated only in a few governments, and chiefly among foreign colonists. Grasses, and fodder of all kinds, every where abound in the Russian empire; and vegetables, for the use of manufactures and commerce, are very abundant, such as hemp, of the produce of which the export, in 1793, amounted to upwards of 8,808,000 rubles; without including the hemp-oil. Flax of the best kind, and most in quantity, is cultivated in the governments of Vologda, Pscove, Novgorod, Riga, Mohilef, Tver, Polotsk, Viætka, the confines of the middle Volga, and in the parts about the Oka and Kama. Both the common and the Siberian flax are often found wild, the former in the steppes, about the northern Ural, the latter on the shores of the Volga, near Tzaritzin, and in other places. Among the plants growing wild, and yielding fibres like flax or hemp, is also the common and the Siberian stinging-nettle (*urtica dioica* and *cannabina*), which are found plentiful on the Uralian mountains.

mountains. The Bashkirs, the Koibals, the Sagayan Tartars, &c. prepare yarn and weave linen of them. Of flax, in seeds and other products, exclusively of the oil, the exportation in 1793 amounted to 7,220,000 rubles. Cotton has hitherto been little cultivated; some attempts have been made about Astrachan and Kitzliar, on the Terek; but there are other climates and soils that would suit it. Some wild-growing silk-plants, yielding a material similar to cotton, known among botanists by the name of "cynanchum acutum," and "apocynum maritimum," grow wild in the worst soils, and might be cultivated and manufactured to advantage. There are also other plants of a similar kind that might become objects of profitable attention. Russia also furnishes a variety of plants that would afford, if duly regarded, abundance of dyeing materials; such as madder, which grows wild on the banks of the Oka, near Riazan and Arfamas, on the borders of the Volga, in the confines of Syfran and Saratof, and in great quantities, and of superior quality, about the Samara, in Taurida, on the Terek, and in several districts of the government of Caucasus; woad (isatis tinctoria), and a variety of it (isatis lusitanica), which are seen wild in several of the southern governments; saffron, which grows wild about the Terek, in the governments of Voronetch and Ekaterinofslaf, in Taurida, and especially in the Caucasian mountains, around Mofdok; and safflower (carthamus tinctorius), which thrives perfectly well in the gardens at Toropetz, Moscow, Tzaritzin, Poltava, and other places. Among the vegetables for fabrication and trade, we might enumerate hops and tobacco; the former grows wild in most districts of Russia and Siberia, and the latter is cultivated in the Malo-Russian governments, and also about the Volga and the Samara, and particularly by the Cossacks on the Orenburg and Siberian lines.

In 1793 the exportation from Russia of hemp-oil and flax-oil exceeded in value 697,000 rubles.

Of medicinal plants of all kinds, Russia possesses a great store; such are the rhubarb (*rheum compactum*), and the rhapontic, or Siberian rhubarb (*rheum undulatum*). *Saxifraga* (*saxifraga crassifolia*) grows abundantly in the southern and lofty snow-mountains of Kolyvan; and the polypodium fragrans, a beautiful and odoriferous fern, is gathered by the Burzets on the summits of rocks, and is taken as a wholesome tea against scorbutic and colicky complaints. The culinary vegetables that are cultivated in Russia are so numerous and various, that it is needless to mention them. Besides those shrubs and berries known to us, such as raspberries, currants, strawberries, which grow in surprising quantities, gooseberries, &c. Russia produces in great abundance several which are here very rarely or never seen. Of these, for instance, are the berries called *pianitza*. In appearance they are much like the bilberry, but have a very different, exceedingly agreeable taste, and intoxicate if taken in quantities. Hence it is they have their appellation, from *pian*, drunk. Mushrooms are found in great plenty, and are very generally eaten, excepting the champignon, which, for what reason it is not easy to discover, is carefully avoided by the common people. Of the Russian mushrooms, the *rishchicki* or *ritzgen* are most famous. This sort of mushroom is likewise found in Courland and Prussia. Their name, *rishchicki*, is derived from their reddish-yellow hue; and they are eaten either raw, boiled or broiled, or pickled. We shall further select some other vegetables that have engaged more than ordinary attention: such are asparagus, which in the government of Moscow, and some others, is made an article of trade; such are berries of various kinds, some of which are peculiar to the north of Russia, as well as to the whole of Siberia; the hazle-bush, found over all Russia as far as the

Kamma, and so plentiful in the regions between Simbirsk and Kazan, as to give rise to a branch of considerable trade, as a great part of Russia and all Siberia are hence supplied with a sweet-meat in very general use, eaten in the falls with nut-oil; sugar-melons and water-melons, which thrive in the open air to the 52d degree of latitude; the common orchard fruits, which succeed every where in the middle and southern parts of Russia. Of all the species of fruit produced in the Russian empire, apples and pears are the most abundant. All the villages on the Oka and Volga have their orchards, or more properly apple-gardens, so that many boors live here without husbandry, merely by horticulture, in good circumstances. Cherries are very frequently produced in orchards, but in Southern Russia there are even whole forests of cherry-trees. Apricots and peaches succeed in most parts of Taurida and Caucasus, and in the southern circles of Kief, Ekaterinofslaf, Vofnesensk, and some other governments, without much attention. The quince-tree grows wild and plentifully in the forests about the Terek; chestnut-trees are only found singly in Taurida, Kief, and Voronetch; walnut-trees are seen in most districts of Southern Russia, and in great abundance; but the almond-tree grows only in the provinces that lie most to the south: figs and pomegranate-trees are seen singly near Kitzliar and in Taurida; but lemons and orange-trees are every where raised only in hot-houses, though Pallas assures us, that they would very well bear the winter in Taurida with more attention. The culture of the vine is at present carried on in the governments of Caucasus, Taurida, Ekaterinofslaf, and Vofnesensk, and the country of the Don Cossacks. The whole region of the Russian empire, from the southernmost borders to the 48th degree of latitude, constitutes a superficies of more than 12,000 square geographical miles; but of this large tract, scarcely one-fourth part is proper for the culture of the vine.

The forests of Russia amount to a superfluous abundance in the governments of Archangel, Olonetz, Tobolsk, and Irkutsk; the governments of Perm, Kazan, Smolensk, Mohilef, Minsk, Tchernigof, Voronetch, Ufa, Tula, Simbirsk, Orel, Kaluga, &c. are richly furnished with them, not only supplying most of the forges and metal founderies, but also sending excellent ship-timber to the yards. Most of the other provinces have a sufficiency for their own consumption; but some few of the southern governments, as Kief, Kharkof, Kursk, Ekaterinofslaf, and Taurida, are but scantily provided. Of trees, those that have narrow-pointed leaves are chiefly indigenous in Northern Russia, forming forests of prodigious extent, among which the fir, the pine, and the black pine, are the most common and most widely diffused. The Siberian cedar (*pinus cembra*) is found particularly in the Uralian mountains; the larch-tree grows in the north of European Russia, and in most of the Siberian mountains. Among the umbrageous trees the birch is the most common, and its bark and wood are applied to various purposes. Next to the birch is the linden, from which Russia derives great advantage. The oak is indigenous only in the European part: it is most frequently found in the governments of Kazan and Voronetch, where it is chiefly employed in ship-building; but also in Little and White Russia it forms considerable forests. The ash and the willow grow almost every where: but beech, elms, the maple, and the poplar, are chiefly the growth of the southern regions. The forests supply an extraordinary number of products for home consumption, and also very considerable articles of export. In 1793 the value of the latter in specie amounted to upwards of 2½ millions of rubles, when Russia shipped off to the value of 1,744,000 rubles in masts, balks, and deals; 394,000 in pot-alhes and

barilla; 249,000 rubles in mats, and 150,000 rubles in pitch, tar, and resin.

The Russian woods consist of limes, firs, pines, birch and larch-trees (*larix*), to which may be added some cedars. The beech and the oak are rarely seen, excepting in Kazan, where the oaks appear pretty plentifully. For ship-building the larch-tree is generally used, though some vessels are constructed of oak, which is brought at an almost incredible expence from the territory of Kazan to the yard of St. Petersburg. The larch, which in other countries is classed among the evergreens, is deciduous in Siberia. Besides the astonishing quantity of wood that is consumed as fuel, Russia has ample supplies of timber for construction. For, throughout the whole empire, excepting St. Petersburg, and a very few other places, the houses and churches are almost all of timber. And even at St. Petersburg great numbers of them are still seen, though, in pursuance of an express imperial edict, no new ones are to be built. These timber houses are extremely well adapted to the Russian climate, as being much warmer than those constructed of brick and stone. Both in towns and villages the same mode of building is uniformly practised. One balk is laid upon another to the height intended. The roof is formed either of boards or oak shingles; and the interstices between the balks are crammed with moss. The Russian carpenters, in the whole construction of a house, employ no other tool than an axe, and a sharp circular iron, with which they shave off the bark from the timber. With the axe alone they carve the ornamental comb or crest (*greben*), which is frequently wrought with exquisite ingenuity, and carried along the ridge of the roof. It appears strange to the foreigner that they never work without gloves, yet always, even in winter, go bare-headed. The generality of houses are only of one story; if they have another, as is occasionally seen in towns, the staircase is usually run up on the outside. In the houses of the boors, as well as those of the citizens, unless they are in good circumstances, are square holes instead of windows, provided with a wooden shutter. Sometimes these apertures are furnished with a hog's bladder, through which the light enters. Only boors of property have windows of glass. The boors' houses regularly consist of one room; which is at the same time kitchen, cellar, hog-stye, and the habitation of the whole family; together with the tutelary saints, who have their tabernacle in one corner of the upper part of the apartment, commonly however so encrusted with smoke as hardly to be cognizable. The boor, with all his inmates, customarily during the winter lodges on the shelves fastened to the walls about the stove which heats his room, and which serves also as an oven for dressing his victuals. Here they constantly sleep, winter and summer, without beds or other accommodations. In all the boor-houses the door of the room is uncommonly low. On account of the abundance of timber, and the cheapness of provisions, and consequently the moderate price of labour, building in Russia is not expensive. For five hundred rubles the burgher builds himself a house of five rooms, with an ice-cellar, stable, a bathing-room, and the necessary offices. The burgher-houses have within a somewhat better appearance than the houses of the boors; the walls within, and frequently without, being chipped smooth and whitened over with a sort of wash used for smearing their stoves, and which dries much faster than mortar. Houses in Russia are reckoned among the moveables, and in every town there is a house-market, where a man bargains for a house, packs it upon sledges, and sets it up wherever he chuses. Such a house will last thirty years, and often longer. Convenient, however, as these timber edifices are in several respects, they are

hazardous in another point of view; since they may be considered as the occasion of such frequent conflagrations as happen in no other country; for, notwithstanding that in towns the houses stand pretty distant from each other, yet there never passes a year in which a very considerable number is not a prey to the flames. This is the less surprising on being informed that the common people generally stick a fir lath (*luchine*) into the wall, lighted at the projecting extremity, as a substitute for a candle, and that the precautions against fires, in the Russian provinces, are none of the best. Mr. Tooke says, that he has himself seen, more than once, in a provincial town, on a calm day at high noon, above 130, and at one time, upwards of 200 houses on fire. The number would certainly have been much smaller, if the houses had not been of wood, and proper precautions had been taken.

Besides the important advantages that Russia obtains from its wood, in regard of fuel and building, this product is profitable in several other ways, particularly in the preparation of potash. The rind of the numerous lindens that grow in the districts of Kazan and Astrachan is usefully employed in the manufacture of basket-work of all kinds; of which, as well as of mats and deals, Russia annually exports to a great amount.

As the mines constitute an object of great importance in the Russian empire, we shall here subjoin, from the work cited at the close of this article, an abridged account of them. The largest works of this kind are at present carried on in the Uralian, the Altayan, and Nertschinskian mineral mountains; the iron and copper mines of Olonetz, and those in several other parts of the empire, being of comparatively less importance. In the Uralian mountains are gold, iron, and copper mines, which latter are some of the most important in the empire. The Altayan mountains contain the richest gold and silver shafts, also veins of lead, copper, and iron, impregnated with gold and silver. But in the Nertschinskian mountains are very rich mines of lead, containing gold and silver. The discovery of these shafts, as well as the origin of the proper mine-working in Russia, is of no older date than the beginning of the last century. The art of mining, which had its rise in the reign of Peter the Great, was protected and encouraged in the year 1716 by a manifesto; and in 1719 he instituted the college of mines. In the reign of the empress Anna, and under the empress Elizabeth, the Russian mines acquired increasing importance and value; but their most brilliant era was the reign of Catharine II. The gold mines belonging to the Russian empire are properly two; *viz.* that of Beresof near Ekaterinenburg, on the Ural, which is by far the most material, and the Voytzer gold mines in the mountains of Olonetz. The most important silver mines are those of Kolyvan, in the mineral mountains of Altay. The silver, or rather the auriferous and argentiferous lead mines of Nertschinsk, have been wrought ever since the discovery of them in 1704.

From statements, which we cannot here detail, it appears that in the interval between 1704 and 1788, there were gained at all the gold and silver mines about 1000 pood of gold, and about 36,000 pood of silver, amounting together in value to upwards of 45,000,000 of rubles, on which the expences were not more than 15,000,000 of rubles.

The most important copper mines are principally in the Uralian, Altayan, and Olonetzian mountains. The entire annual amount of the copper obtained from them is about 200,000 pood; the value of which in money, reckoning the pood only at 10 rubles, makes a sum of 2,000,000 of rubles.

The iron mines form, next to the salt-works, the greatest portion

portion of all Russia's mineral wealth: the most numerous and rich of these are found in the Uralian mountains; and besides these there are two smelting-houses in the Altayan and Sayane mountains, and several in the governments of Olonetz, Vologda, Nishnei-Novgorod, Kostroma, Kurk, Tula, Tambof, &c. We may allow for the whole empire about 100 forges, and 800 hammers. In the whole empire about 5,000,000 pood of iron are annually produced, which in specie amounts at least to 4,500,000 of rubles.

By the present constitution, the mines belong either to the crown, to public institutions, or to private individuals. The first possess all the before-mentioned gold and silver mines: the share it has in the copper and iron mines is not accurately ascertained, but, according to authentic statements, concluded to be about $\frac{1}{3}$ th of the former, and $\frac{1}{4}$ th part of the latter. The crown mines, which were formerly under the superintendance of the mine college, have, since the abolition of that college in 1784, belonged either to the cabinet or to the senate. The gold and silver mines of Kolyvan and Nertschinsk are under the direction of the former, and the rest of the crown mines are dependant on the senate. The only public institution hitherto in possession of mines is the "Imperial Assignment Bank," which purchased the copper and iron works in the government of Perm. The private mines have received so many grants by law, that it is not easy to assign to individuals their respective rights and immunities. The private owners of mines are mostly nobles, but some are burghers and merchants. The works at the mines of the crown, as well as those belonging to private persons, are partly carried on by mallet-workmen, partly by inrolled boors, partly by vassals, and partly also by free workmen. From these mines Russia obtains annually of gold about 40, and of silver about 1300 pood, amounting, according to the prices in 1789, to the value of 1,729,000 rubles. These metals are brought to St. Petersburg, and there mostly coined, having been previously separated at the imperial office for that purpose, and brought to the perfect standard. Of copper are annually gained about 200,000 pood, estimated in value at about 2,000,000 of rubles. The copper which the crown receives from its mines, as well as from the taxes of private proprietors, is wholly coined. The export of this metal is inconsiderable; as in 1793 it amounted, from all the sea-ports of the empire, only to 187 pood, equal in value to 2910 rubles. Of iron, about 5,000,000 of pood are obtained, the value of which, on account of the fluctuating price, cannot be accurately ascertained. Russia exports every year so great a quantity of this metal, that, next to hemp, it forms the most important article of exportation: In 1793 the export in bar and cast-iron, as well as in cast-iron goods, amounted to 3,033,249 pood, or in value of money by the custom-house books, to 5,204,125 rubles. Lead is found in all the mines, particularly in those of the Nertschinsk and the Altay; but Russia deriving little advantage from it, imported in 1793 at the port of St. Petersburg 36,000 pood, valued at 125,000 rubles. Tin has not as yet been discovered, nor have the semi-metals in general been produced. Russia has ample stores of noble, precious, and durable kinds of stone, which we shall not now record. Turf and coals are found in some parts, the argillaceous earths in great quantities, sulphur sufficient to prevent the necessity of importation, of salts inestimable stores, and of curious petrifications and mineral waters, Russia has a sufficient quantity.

The salt-works of Russia are numerous, rich, and productive. The salt is obtained partly from salt-mines, partly from salt-lakes, in which it crystallizes spontaneously, and partly from salt-springs, by boiling the brine, and evaporation. But notwithstanding its inexhaustible sources of salt,

Russia has not sufficient for the supply of all the provinces without importation. According to the facts above transiently stated, it may be admitted that there is produced annually in the Russian empire, of gold about 40 pood, of silver 1300, of lead 30,000, of copper 200,000, of iron 5,000,000, and of salt 12,000,000; the value of all which in money may be estimated, by the most moderate computation, at 13,000,000 rubles; and if we allow for the advance in the price of mineral products since 1788, and consider their present value, the said sum may be fixed, without exaggeration, at 15,000,000 rubles. According to the lists of exports in 1793, the total capital with which the productive industry of the Russian empire enriched it in that year amounted to 30,823,000 rubles; and this, it is said, is rated too low.

Manufactures and Trade of the Russian Empire.—Manufactories of wool, cotton, silk, flax, metals, &c. paper-mills, wax-bleacheries, salt-petre and glass-houses, tapeltry and porcelain fabrics, with many similar establishments, belonging partly to the crown and partly to individuals, and especially the working of mines, employ an immense number of people, as well artists as tradesmen, both in town and country. Oils of various kinds, isinglass, caviar, soap, tallow-candles, beer and other liquors, brandy and spirits, vinegar, aqua-fortis and aqua-regia, potash, salt-petre, alum, vitriol, bitter salt, sugar, colours for dye-houses, dyeing, tobacco, paper, paper-hanging, play-cards, printing, sail-cloth and cordage, linen, cotton, silk, gold and silver lace, cloth and stuff, carpet, hat, Russia leather, or red and black yuffs, which for colour, smell, and softness, cannot be equalled in any other part of the world, (see *YUFFS*.) shagreen, wax, cabinet and coach-making, glass, plate-glass, stone-cutting, earthenware and porcelain, feathers, pitch-drawing, charcoal, sulphur, powder, iron in various ways, and for various purposes, copper and brass, cannon, gold and silver, clocks, mammoth's bones, the best of which are found about the rivers Katanga and Indighirka, &c. &c. are the subjects of manufacture, and of the operation of artists in the Russian empire. Siberia produces also a fossil which has the properties of asbestos. It is soaked, like hemp, in water, the threads are then drawn out, of which a linen is made which resists the action of fire.

The commerce of Russia is naturally divided into foreign and domestic: and these again into the maritime commerce on the Baltic and the White sea, on the Euxine and the Caspian; and the commerce by land with Poland, &c. with Persia, with the Kirghises, and with China. The inland commerce is small, and is mostly conducted by shop-keepers and monopolizers; and the chief transport of goods by land is by caravans. The petty merchants carry on their trade by travelling from place to place about the country, and this kind of traffic supports and even enriches many families. Formerly all traffic was confined to the annual fairs; but for a long time every city and town, and many villages, have a regular market, besides the annual fairs. Until about the close of the 15th century, the foreign commerce was trifling, and almost wholly confined to Novgorod. But since the time of Peter the Great, commerce has revived. With the merchants of Russia it is a general practice to be paid half the price before-hand of the inland commodities which they buy up and deliver to foreigners, according to contract, for exportation; but to take foreign goods upon a year's credit. The most considerable maritime commerce is at St. Petersburg and Riga, by way of the Baltic at Archangel, on the Northern ocean, &c., at Taganrok on the Euxine, at Altrachan on the Caspian, and at Kamtschatka on the Eastern ocean. The principal seats of the foreign commerce by land are the Ukraine, whence the

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Russian merchants visit the markets of Poland, and the fairs of Germany; Orenburg, where a considerable trade is carried on with several Asiatic nations; and Kiachta in Daouria, where a great mercantile intercourse is held with China.

Hermann states the Russian commerce, in all the ports, which may generally be termed the Baltic trade, as amounting, in 1790, to a sum of 35,750,000 rubles, of which the exports make 21,200,000, and the imports 14,550,000 rubles. From all the ports belonging to Russia in the Euxine or Black sea, the exportation is reckoned at about one million, and the importation at one million and a quarter. The principal articles that find a vent here are, cannon, furs, salted beef, butter, cordage, sail-cloth, caviar, corn, and a variety of Russian manufactures, especially iron, linen, cotton stuffs, &c. The imports are, wine, fruit, coffee, silks, rice, and all kinds of Turkish commodities. The exports over the Caspian are stated to be about 1,200,000, and the imports 1,000,000 rubles. The articles of exportation are nearly the same with those that find purchasers on the Euxine, and in return scarcely any thing is taken but silk. See CASPIAN.

The commerce by land with the Poles, Prussians, &c. is considerable. From these countries Russia takes commodities for about 2,000,000 of rubles, and carries to them for scarcely 500,000. The principal objects of importation are scythes, cloths, linens, hemp, flax, &c. the two last of which products are sent off again from Riga. The commerce by land with Persia passes over Kitzliar and Mofdok, and Russia receives principally, by the same course, silk. The exports amount to about 100,000, and the imports to 200,000 rubles. The commerce with the Kirghises is mostly carried on in the way of barter, and chiefly in the Siberian fortresses of Orenburg, Troitzk, Peterpavlovsk, Yamisheva, Semipalat, and Ustkamenogorsk. Goods to about 1,500,000 of rubles are exported, and imported to the same amount. The Kirghises bring principally horses, horn-cattle, sheep, and very costly sheep-skins, receiving in return from Russia woollen cloths, iron, and a great quantity of household goods and other European commodities. The Chinese commerce is merely a barter, but very considerable. Russia, it is said, has of late years received thence articles for 2,000,000 of rubles, and returned them for nearly as much. The chief articles that come to Russia from China are, tea, silk, and kitaika (nankeen), and of those that are carried thither, the valuable Siberian furs. The total aggregate of the commerce of Russia by land is stated at near 9,800,000 rubles, which gives a balance of about 1,600,000 rubles against the empire.

In 1790 the trade of Petersburg and Riga amounted to as much as the trade of the whole empire in the year 1762, which was then more than twice as much. According to Hermann, the aggregate of the commerce of the empire then amounted to about 50,000,000 of rubles, by which Russia gained near 5,000,000 annually. The returns thus made by the Russian subjects, reckoning exports and imports together, amounted to 15,000,000, among which those commodities are to be understood, which are imported and exported in ships either built or bought in Russia. The subjects have accordingly a share of nearly one-third. The total of the imports and exports of Kiachta may be fairly stated at 4,000,000 of rubles.

In an empire that has 30,000,000 of inhabitants, the *internal* trade must be much more important and valuable than the external commerce. The Siberian commerce, that is, the commerce of the governments of Irkutsk, Kolyvan, Tobolsk, Perm, and Ufa, is of great consequence. All the products of these parts, not consumed in the country,

or not disposed of to China, or to the Kirghises, go by the interior districts and ports of Russia. The major part at least of the heavy commodities is brought almost entirely from the eastern regions of Siberia to St. Petersburg. Most of the return or barter of European commodities against Siberian furs, and against Chinese commodities, is carried on in the town of Irbit, in the government of Perm, where a famous fair is held in the months of January and February. The products carried every year from Siberia to Russia are estimated at 12,000,000 of rubles, which are thus drawn annually by Russia from Siberia; so that Siberia has not unjustly been called the Russian Peru. The interior commerce of the Russian provinces with one another, and their traffic in the ports and frontier places of the empire, are of still greater importance. This kind of lucrative intercourse is facilitated by the many large rivers with which the whole empire abounds. Several considerable fairs that are held in various towns and cities of the empire, contribute in a very great degree to aid the prosecution of traffic. The most considerable of these fairs is that at Makarieff, a monastery and city in the government of Nishnei-Novgorod, at which the Siberian and Russian merchants assemble from all parts of the country. Among the trading cities of greatest note, the principal are St. Petersburg, Riga, and Moscow. The latter is the central point at which all the affairs of the interior commerce of the empire flow together and unite, and it contains a numerous and opulent body of mercantile men. Mr. Tooke estimates the aggregate national wealth of Russia in the following manner: 30,000,000 of inhabitants of both sexes, making about 6,000,000 of families, each family consisting of five persons, consume monthly at least 48,000,000, in the whole therefore 576,000,000 of poods of all kinds of meal, grits, &c. each pood, on an average, at 25 kopeeks, makes a sum of

	Rubles.
	144,000,000
Consumption of brandy, 5,000,000 of eymers, } each at 3 rubles - - - - - }	15,000,000
Salt, 12,000,000 of poods, at 35 kopeeks - - - - -	4,200,000
Gold, silver, lead, copper, iron, &c. - - - - -	8,750,000
Fine and coarse furs - - - - -	5,000,000
Hemp, flax, tobacco, linens, hemp-oil, lin- } seed-oil, &c. - - - - - }	30,000,000
Fire-wood, timber, charcoal, ship-timber, tar, } pitch, &c. - - - - - }	20,000,000
Cattle, leather, wool, milk, pulse, garden } vegetables, &c. - - - - - }	58,050,000
Product of the fisheries - - - - -	15,000,000
Total - - - - -	300,000,000

Of this capital, there comes to the annual share of each individual 10 rubles.

By commerce, the annual exports of this capital are,

	Rubles.
In metal wares about - - - - -	3,000,000
In hemp, flax, and articles prepared from } them - - - - - }	10,000,000
In leather, tallow, furs, and all other products } from the animal kingdom - - - - - }	8,000,000
In corn, wood, and other petty articles - - - - -	4,500,000
Total - - - - -	25,500,000
To this add the transport at - - - - -	2,000,000
which together make out - - - - -	27,500,000

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The quantity of money circulating in the empire in 1788, is stated as follows :

	Rubles.
In gold and silver coin - - - - -	76,000,000
Copper coin - - - - -	54,000,000
Paper money - - - - -	100,000,000
Total - - - - -	230,000,000

Add together this sum, and the progressive value of the product, and there appears an annual political revenue of 530,000,000, or, to confine ourselves to the lowest, of at least 500,000,000 of rubles. The quantity of specie, from the above-mentioned period, is said to be every year increased :

	Rubles.
By money struck of Siberian gold and silver, } about - - - - -	1,700,000
By foreign coinage of various sorts - - -	1,300,000
By copper money - - - - -	2,000,000
Total - - - - -	5,000,000

Forces of the Russian Empire.—The Russian army consists partly of regular infantry and cavalry, and partly of irregular troops. To the latter class belong the Kozaks or Cossacks, who answer all the purposes of regular hussars, and have acquired great military reputation. The most serviceable of this class of warriors are divided into those of Ekaterinofslaf and those of the Euxine. It is impossible, from any documents before us, to ascertain the precise number of the Russian military; but from a statement given by Mr. Tooke from the college of war in the year 1791, they amounted to about 600,000 men, of whom might be reckoned at least 500,000 effective soldiers in actual service. Some authors have degraded the value of the Russian soldiers, but from some late memorable exploits their character must have risen in general estimation. A circumstance that distinguishes them is the small pay, on which they are able to subsist. Frederic II. pronounced them to be excellent soldiers. Accordingly it is said, that the Russian soldiers will not fall back one step, while his commander bravely keeps his ground; he contents himself with an extremely little pay, and with very slender diet, and is always cheerful; hungry and thirsty he traverses the heavy sands of the deserts under the load of his accoutrements, without murmur or complaint; executes every command; reckons nothing impossible or too difficult; does every thing that he is ordered to do without shunning any danger; and is inventive of a thousand means for accomplishing his design. What may not be performed with such an army when led on by experienced and valiant generals, in whom they have confidence. Let the soldier but see that he is spared as much as possible, he attaches himself with all his soul to his commander, and performs almost miracles. Well might the empress denominate the Russians an obedient, brave, intrepid, enterprising, and powerful people.

In general, it may be affirmed, that no army in Europe costs so little as the Russian, and that no soldiers in Europe can subsist on so little pay as the Russian. For, what other European soldiers will subsist on an annual pay not amounting to more than seven or eight rubles, or, when in garrison, only half that sum, and the allowance of grits and flour weighed out to him with the utmost nicety?

Concerning the pay of the officers, &c. it must be observed, that the officers of the garrison regiments in the towns of the Baltic, have double the pay of other garrison

regiments; that the officers of all marching regiments have three times the pay of the officers of the regiments in the provinces; and that the private men in the guards have double the pay of those in the marching regiments. A general field-marshal is allowed, *per annum*, 7000 rubles, 200 rations, valued at 1140 rubles, and 16 denshiks or servants.

	Rubles.	Rations.	=	Rubles.	Densh.
A general in chief	3600	80	=	456	12
A lieutenant-general	2160	50	=	285	10
A major-general	1800	40	=	228	8
A brigadier -	840	20	=	171	7

In the marching regiments a colonel is allowed yearly 600 rubles, for rations 96 rubles 90 kopecks, and 6 denshiks or servants.

	Rubles.	For	Rub.	Kop.	Densh.
A lieutenant-colonel	360	Rations	62	70	4
A major - - -	300	—	62	70	3
A captain - - -	180	—	28	50	2
A lieutenant - -	120	—	22	80	1
A second lieutenant	84	—	17	10	1
An ensign - - -	84	—	17	10	1
A quarter-master } of a regiment	84	—	22	80	1
An adjutant - -	120	—	22	80	1

A private man is allowed yearly 10 rubles 98 kopecks, besides three barrels of meal, a certain quantity of grist or coarse oatmeal, 24 pounds of salt, and flesh to the value of 72 kopecks, all which articles are computed at 5 rubles 74 kopecks. But 6 rubles 35 kopecks are deducted from the pay of every private man for clothing, medicines, flesh, cartridges, and repairing of fire-locks. His whole clothing from head to foot costs near 12 rubles.

The navy of Russia consists of two fleets, distinct from each other. The creator of the Russian fleet was the emperor Peter I. Before his reign armed vessels, much less ships of war, were not known in Russia; but in consequence of travelling into foreign countries, for the sake of informing himself concerning the best method of building ships, and with a view of introducing it into his empire, he raised a maritime force, and caused a set of regulations to be printed for the establishment of a navy. The admiralty is at Petersburg, with a high admiral at the head of it. According to the regulation of Peter I., the high admiral has the rank and pay of a general field-marshal in the army; an admiral those of a general-in-chief; a vice-admiral those of a lieutenant-general; and a contre-admiral those of a major-general. The captains in the navy were divided by Peter I. into three classes. At present, the captain-commander has the rank of a brigadier in the army; the captain of the first class the rank of a colonel, and the captain of the second class that of a lieutenant-colonel; the captain-lieutenant that of a premier-major; the lieutenant that of a captain in the army, and the midshipman that of a lieutenant. The pay of the high admiral *per annum* is 7000 rubles; that of an admiral, 3600; of a vice-admiral, 2160; of a contre-admiral, 1800; of a captain-commander, 840; of a lieutenant 200, and of a midshipman 120 rubles. Officers are allowed denshiks or servants, *viz.* a lieutenant two, and the rest in proportion. When they are at sea, the officers are allowed table-money, *viz.* in the Baltic, each officer monthly has seven rubles, and the captain somewhat more. On long voyages this allowance is increased. The sailors are divided into two classes: to the first belong the experienced, at 18 rubles *per annum* each; but those of the second class have only 12. Moreover, they are fed while at sea;

sea; but when on shore, each receives his ordinary provision, as in the land service. To a ship of 100 guns the crew is usually reckoned at 1000 men.

Russia had formerly no more than two dock-yards, those of Petersburg and Archangel, to which have been added those of Kherfon, Cronstadt, and Taurida. At Petersburg and Cronstadt the men of war are constructed of oak, transported thither at a great expence from Kazan. At Archangel the ships are built of the wood of the larch-tree.

Revenues of the Russian Empire.—Mr. Coxe estimates the national revenue of Russia at 41,830,910 rubles, which is below the just amount. Mr. Tooke professes to give a more accurate statement: and he begins with enumerating the sources from which the national revenue is derived. The *first* of these sources is the “head-money,” paid only by male heads, including babes and old men, and supposing 12,000,000 of taxable persons, and averaging them at 72 kopecks each, the amount will be very considerable. The *second* source is the “tax upon the capital of merchants,” or, as it is sometimes called, the *per centage*. Every one pays yearly one *per cent.*, in return for which he and his children are exempt from the poll-tax. The *third* source of revenue is the “domain lands,” the income of which is very various. 4. The “sea-duties,” which are liable to great fluctuations. 5. The “land-tolls.” 6. The duties on “law-proceedings,” commonly called “poschlin,” to which may be referred the passport money. 7. “Stamped-paper,” which brings in a considerable sum *per annum*. 8. The duty on the “sale of immoveable property,” including not only houses and lands but also vassals; fixed by the late empress in 1787 at five *per cent.* 9. The “kabaks,” or tipping-houses, or the sale of corn spirits. 10. The “salt-trade.” 11. The “mines.” 12. The “mint.” 13. “Natural products.” 14. The share of “excise and recognition duties” in towns. 15. The “posts.” 16. All kinds of “rent” for places, shops, mills, parcels of ground, bee-hives in forests, bathing-houses, fisheries, public inns, &c. 17. “Recruit money” from merchants, from which foreign merchants are exempt. 18. Various “pecuniary penalties.” The amount of the receipts from the several towns is upwards of 46,000,000 of rubles, which it has been thought may be rated at 48,000,000.

Coins, Measures, and Weights of the Russian Empire.—We are informed by Mr. Tooke (*ubi infra*), that previous to the 10th century neither foreign nor domestic coin was known in Russia; but that instead of it, small pieces of marten and squirrel skins, stamped, were the only currency. From that period frequent mention is made in the chronicles of Grecian and other sorts of money. It is said by some persons, that the first coins were introduced by the Tartars into Russia, and that the Russian word for money, “denghi,” is derived from the Tartarian term “tanga,” which signifies a token; but, when coins were impressed with the arms of Moscow, *viz.* a St. George and his spear, the name “kopeka” arose from kopæ, or kopeitzo, a spear. Towards the middle of the 16th century, though coins had been struck in several places before, the tzar Ivan Vassilievitch instituted the first regular coinage, set up a mint at Moscow, and caused three rubles to be struck out of one “grivenka,” denoting probably a certain weight of silver. However, at this time, and long afterwards, the ruble was only an imaginary coin. The first actual rubles were struck during the reign of tzar Alexey Mikhailovitch, in the year 1654, though history makes mention of the ruble about the year 1317. The first ruble of 1654 is still extant, and it is easily discernible to have been previously a Spanish cross-dollar; Russian rubles having been recoined from dollars. A foreign dollar then passed for 50 kopecks. But afterwards, in consequence of

the war with Poland, the coin suffered a diminution; and for some time, kopecks and altines were struck of copper. The intrinsic value, however, of the ruble remained unaltered at 100 kopecks. Various alterations were made in the coinage by Peter I. By an edict of 1724, he ordered that no more silver kopecks should be coined, and in lieu of them he caused to be struck one and two-kopeck pieces of copper, having on one side the St. George, and on the other within the initial of the emperor’s name П, the value of the coin. All mints were abolished except those at Moscow; and in process of time a mint was set up at St. Petersburg, which is at present the only one where gold and silver coins are struck. Although the mint of Moscow still exists, it is confined to the coinage of copper money. At this time Russia has one mint for silver and six for copper coin.

After the battle of Pultava, Peter caused to be coined pieces called *sun-rubles*, now very scarce, having on the reverse a sun in the centre, and in the area the initial in Russ П. Besides the ruble, there were coined at the same time half and quarter-rubles (poltiniki and polpoltiniki, or poltins and polpoltins), bearing his likenefs and the imperial eagle. The *grievens*, or tenth part of a ruble, had 10 dots, with the inscription “Grievenik” on one side, and the eagle on the other. The *altins*, or three kopecks (copecks), had on one side the eagle, and on the other the date of the year and the word “Altinik.” These were all the silver coins under Peter I. The empress Elizabeth for a short time caused five-kopeck pieces to be coined, which have long since ceased. The gold coins in Russia have been always struck in larger sorts than those of silver. Nevertheless most of the gold coins, of ancient times, still subsisting, consist of very small sorts. There are some that are called “golden kopecks.” A Russian ducat was formerly equal to two rubles silver, whence probably arose the denomination of golden ruble, as well as the quarter-ruble, now shewn as curiosities. Under Peter I. the gold coins were either two-ruble pieces, with the apostle Andrew on the reverse, which are very rare; or ducats with a Latin inscription. On one side is the bust of Peter with a crown of laurels, on the other the Russian imperial eagle, with the St. George on its breast. Both sides have round them “Petrus Alexii I. D. G. Russ. Imp. M. Dux Moscoviæ 1716.” The empress Elizabeth first caused imperials, half-imperials, golden rubles, and half-rubles, to be struck. At the accession of Peter I. the copper coins were half-kopecks (*denufchka* or *denga*), kopecks, and five-kopeck pieces. On the first, stands on one side “Denga,” and on the other 1706. The kopecks have on one side the St. George, and on the other “Kopeika.” The five-kopeck pieces have undergone several alterations. The copper five-kopeck pieces that had been struck by Elizabeth were fixed by Peter III. at 10, but Catharine II. reduced them again to five kopecks. For the accommodation of the provinces of Esthonia and Livonia, the empress Elizabeth, in 1757, caused to be struck the *livoneses* of whole, half, and quarter pieces; the whole piece being in value 96 kopecks; but the coinage of these soon ceased.

In Russia, accounts are kept in rubles of 100 kopecks or copecks. The ruble is divided into 10 *grievens*, 33½ *altins*, or 50 *groschen*; and the kopeck or copeck is divided into 2 *denufchkas*, or 4 *polufchkas*. The coins now in circulation are, of gold, the imperial, and half-imperial of 10 and 5 rubles; double and single ducats, which were formerly worth 4½ rubles and 2½ rubles; but their value was raised, in 1764, that of the double ducat to 5 rubles 60 copecks, and the single to 2 rubles 80 copecks. The silver coins are, rubles of 100 copecks; poltins, or half-rubles, of

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50 copecks; polpoltins, or quarter-rubles, of 25 copecks; double and single grieven, of 20 and 10 copecks; and pieces of 5 altins or 15 copecks; payte-copecks of 5 copecks each, and altins of three copecks, the two latter of which are now nearly out of circulation. The copper coins are pieces of 10 copecks, called grieven or grievnik, of 5 copecks or pataki, which are the most common, of two copecks or grosch, of 1 kopeck; also denuschkas or half-copecks, and polufchkas or quarter-copecks. The following table shews their mutual relation as to value:

Ruble.	Grievnik.	Altine.	Copecks.	Denuschkas.	Polufchkas.
1	10	33 $\frac{1}{2}$	100	200	400
	1	3 $\frac{1}{2}$	10	20	40
		1	3	6	12
			1	2	4
				1	2

Dutch ducats are worth 2 $\frac{1}{2}$ rubles, more or less; Dutch and Danish rixdollars pass for 1 ruble 40 copecks; or 14 rixdollars, weighing a Russian pound, (1 lb. 1 oz. 3 dwt. 2 gr. troy,) are worth 19 rubles 6 copecks.

The fineness both of gold and silver is expressed in solotniks, the pound or other weight being divided into 96 such parts. The solotnik is also the $\frac{1}{96}$ th part of a Russian pound weight. By the ukase, or edict, of 1763, the imperial was to weigh 3 $\frac{2}{3}$ solotniks, the half-imperial 1 $\frac{1}{3}$ solotniks; and the gold to be 88 solotniks, or 22 carats fine. Also, 118 ducats were to weigh a Russian pound, 93 solotniks fine, or 23 $\frac{1}{2}$ carats. By the same edict, silver of 72 solotniks, or 9 oz. fine, was coined into rubles and half-rubles, at the rate of 17 rubles 6 $\frac{1}{2}$ copecks *per lb.*; into quarter-rubles and 20-copeck pieces, at the rate of 17 rubles 15 $\frac{1}{2}$ copecks *per lb.*; and into grievens and 15-copeck pieces, at the rate of 17 rubles 25 $\frac{1}{2}$ copecks *per lb.* Copper was coined at the rate of 16 rubles *per pood* of 40 Russian pounds. New regulations were established by an edict of the emperor Alexander, in 1801; according to which, 22 $\frac{1}{2}$ rubles are to contain a Russian pound of fine silver; and they are to be 83 $\frac{1}{2}$ solotniks (11 oz. 8 dwt.) fine; and thus each ruble should weigh 320 $\frac{1}{2}$ English grains, and contain 277 $\frac{1}{2}$ grains of fine silver. It was also declared, that no gold coin should hereafter be struck in Russia, except the imperial and half-imperial, the standard of which was raised to 94 $\frac{1}{2}$ solotniks, or 23 $\frac{1}{2}$ carats; and the weight of the imperial reduced to 2 $\frac{1}{3}$ solotniks, or 188 $\frac{1}{3}$ English grains; by which the value is nearly the same as before.

According to these mint regulations,

	£	s.	d.	
The imperial is worth	1	12	9 $\frac{1}{2}$	} valued in English gold.
The ducat - - - -	0	9	1	
The ruble of 1763 - -	0	3	3	} valued in English silver.
The ruble of 1801 - -	0	3	2 $\frac{1}{2}$	

The following is the report of an assay lately made on a number of rubles at the London mint, by order of the Bank of England. Rubles of 1763, weight from 14 dwt. 21 gr. to 15 dwt. 20 gr.; average 15 dwt. 8 $\frac{1}{2}$ gr.; fineness 44 dwt. worse than English, that is, 8 oz. 18 dwt. Rubles of 1801, weight from 13 dwt. 2 gr. to 13 dwt. 12 gr.; average 13 dwt. 7 gr.; fineness 14 dwt. worse than English, that is, 10 oz. 8 dwt. Hence we have the value of the old ruble, 3s. 2d. sterling; and of the new, 3s. 2 $\frac{1}{2}$ d.

Besides the hard coin, "paper money" constitutes the chief circulating medium or money of Russia, under the denomination of "bank-assignments." Until the year 1787, these notes of 100, 50, and 25 rubles in circulation were estimated at the amount of 50 millions of rubles. They

were so readily taken through the whole empire, instead of copper money, that, in many places, 1, 2, and as far as 5 *per cent.* agio must be given to get paper money for copper. In 1787 the old notes were liquidated, and a fresh issue was made to the amount of 100 millions. They are at a *per cent.* of 100, 50, 25, 10, and 5 rubles. By the ukase of August 3, 1788, it was ordered, that there should be never more than 100 millions in circulation. It was customary to convert them into copper money on demand at the assignation-banks; but they fluctuate considerably in value, and with respect to gold and silver they are mostly at a discount; and even on copper there is sometimes an agio against them, as they are not always paid off in this metal, when the sum is considerable. The ruble of exchange is subject to a similar depreciation. In 1770 this ruble and the paper ruble were at par with the silver ruble; in 1790 they were 20 *per cent.* worse; in 1799 the paper ruble was 60 *per cent.* below par, and the ruble of exchange 50 *per cent.*; in 1803 the paper ruble was 20 *per cent.*, and the ruble of exchange 10 *per cent.* below par; and in 1808 they were 100 *per cent.* worse, that is, 1 silver ruble was worth 2 rubles of exchange, or 2 of bank paper.

Bills of exchange are paid in copper, or bank notes; but this chiefly regards inland bills, as foreign merchants scarcely ever draw on Russia. The commercial debts here are usually settled by drawing and remitting bills on foreign countries.

Petersburg, Archangel, Moscow, &c. draw on the following places, and give Amsterdam 1 ruble for 37 stivers current, more or less, at 65 days' date; Hamburgh, 1 ruble for 34 schillings or sols banco, more or less, at 65 days' date; London, 1 ruble for 38d. sterling, more or less, at 3 months' date.

The ruble here mentioned is not the silver ruble, but the ruble of exchange, which, as we have just stated, is subject to great fluctuations.

Bills drawn in Russia, payable after date, are allowed 10 days' grace; but if payable at sight, 3 days only; but bills payable at so many days after sight are not allowed any days of grace.

During the reign of the empress Catharine, three different banks were established at Petersburg, *viz.* the Loan-bank, the Assignation-bank, and the Loan-bank for the nobility and towns; and during the reign of the emperor Paul, the Aid-bank and Discount-office were established.

The "Loan-bank, or Lombard," lends money on gold, silver, jewels, &c. A year's interest is taken in advance, which, according to the legal rate, is 5 *per cent.* No interest is paid for money drawn out, on giving two days' notice; but if a declaration be made, that the money will be left there a year, and that a notice of three months shall be given of the intention to draw it out, the legal interest is allowed, payable in the same kind of money in which the deposit was made. The property of this bank belongs to the Foundling-hospital at Petersburg.

The "Assignation-bank" was opened in Petersburg and Moscow in the year 1770, and branches of it have been extended to Yaroslaf, Smolensk, Veliki-Ustiug, Astrachan, Nishnei-Novgorod, Vifchnevolotschok, Novgorod, Piteove, Tver, Nefchna, Kief, Kursk, Kharkof, Tambof, Orel, Tula, Kazan, Kherfon, Archangel, Riga, and Revel. This bank issues notes for 5, 10, 25, 50, and 100 rubles. In 1786 it was converted into an imperial establishment, when all the old notes were called in, and exchanged for new ones. It is engaged that these notes are to be reimbursed on demand in copper money, and that the total amount should not exceed 100 millions of rubles; but the number

number now in circulation is supposed to be greatly beyond this limitation.

The "Loan-bank for the nobility and towns" was established in 1786, for the purpose of advancing money to the nobility on landed property or on male peasants, and to the cities or towns on the security of stone and brick houses. The annual interest charged is 5 *per cent.*; besides which, 3 *per cent.* must be paid annually, towards diminishing the capital, or redeeming part of the mortgage, till the whole be repaid. The loans are made in assignation-notes. This bank is also empowered to insure houses, buildings, and other property, on which it has advanced money, at the annual premium of 1½ *per cent.* It is also allowed to coin money of gold, silver, and copper, according to the mint regulations; and it has the liberty of discounting bills at ½ *per cent.* *per month.*

The "Aid-bank" was established in 1797, for affording relief to noblemen, whose estates are mortgaged, or burdened with debts; and also for advancing money to those who wish to improve their estates, to establish works or manufactures, &c. The property is valued according to the number of male peasants on the estates, who, in different provinces, are valued at 40, 50, 65, and 75 rubles *per man.* The money is advanced in tickets secured on the estates, which are transferrable, and are to be taken as legal money in all the departments of government. These tickets may remain in circulation for 25 years, reckoning from the time of opening the bank. The annual interest is 6 *per cent.* for the first five years, and 5 *per cent.* for the following years; and a part of the debt is to be discharged annually, till the whole be repaid, which must be done within 25 years from the opening of the bank. If the interest is not regularly paid, a fine is imposed, which increases at the rate of 1 *per cent.* *per month*, till the third month; and if the interest is not then paid, together with part of the capital, the management of the estate is taken from the owner, and given to noblemen who live nearest to it, and they are to receive the produce, and remit it to the bank, till the debt is entirely paid. The payment must be made in copper money, or notes of the Assignation-bank.

The "Discount-office" was established in 1797, for advancing money on bills and on goods of Russian produce, and also for insuring the goods on which such advances have been made. The holder of the bills or owner of the goods must be a Russian subject; but money is advanced to foreigners, and all sorts of people, on gold and silver.

The Russian weights are as follow: the berquet or berkowitz = 10 poods; the pood = 40 lb.; the lb. = 32 loths or lotes; and the loth = 3 solotniks. The Russian lb. = 28 loths, Cologne weight, or 6314 troy grains; so that 500 lb. Russian = 451 lb. avoirdupois. Among merchants, the ordinary computation is, that 36 lb. avoirdupois = the Russian pood, and that 63 poods = 1 ton avoirdupois. Hemp, flax, and cotton, are sold by the berquet; copper, iron, cordage, horse-hair and tails, linseed and hempseed oil, isinglass, morocco leather, potash, wax, bristles, and tobacco, are sold by the pood.

The measures of Russia are, for corn, the chetwert or cool = 2 osmins = 4 pajacks = 8 chetwericks = 64 garnitzy. A cool of flour = 9 poods, and a sack = 5 poods. The chetwerick is 13½ English inches in diameter, and 11½ in depth; so that it measures 1555.92 cubic inches, and contains 5½ Winchester gallons nearly. In business the computation is, that 100 chetwerts = 72 quarters, and 1 chetwert = 5½ bushels, Winchester measure. For wine, the cask, sarkowoi, or pipe, contains 40 vedros; the vedro = 8 osmucki or krushkas, and the krushka = 11

tsharkays or cups. In Petersburg the vedro contains 621 French, or 752 English cubic inches: hence 1 vedro = 3¼ English wine gallons; and 3 krushkas = 1 English ale gallon. The long measures are an arsheen or arshine, which is divided into 16 werfchocks or werfhoks = 28 English inches; so that 9 arsheens = 7 English yards, and 4 werfchocks = 7 English inches; a saze, sahe, sajene, or fathom = 3 arsheens, or 7 English feet; a werst, verst, or Russian mile = 500 sajenes = 1500 arsheens = 3500 English feet = 20 wersts = 3 German miles, and 264 wersts = 175 English miles; so that a werst is nearly two-thirds of an English mile; and a degree of the meridian is reckoned to be about 104 wersts. The Russian foot is 155 French lines = 13½ English inches; and the Moscow foot = 148½ French lines = 13½ English inches; but the English foot, as well as the Rhineland foot, is generally used in Petersburg. The superficial measure, called dessetina or dessetine, contains 2400 Russian square fathoms, or 21,600 square arsheens = 13,066½ English square yards, or 2 acres 2 roods 32 perches; hence 10 dessetinas correspond to 27 English acres nearly.

In Russia the Julian calendar, or old style, is still retained, which (since the year 1800) is 12 days later than the new style; so that a Russian bill, dated the first day of any month, must be reckoned from the 13th day of the same month in England, and in every other place where the Gregorian calendar, or new style, is used.

Having availed ourselves of the materials which are furnished by Mr. Coxe, in his "Travels" and "Russian Discoveries," and by Mr. Tooke in his comprehensive and very interesting "View of the Russian Empire," in the compilation of this article, we shall close it with observing, that the immense territory of the Russian empire naturally forms itself into two great divisions, by the vast Ural chain of mountains, that intersect it from north to south; but these divisions are very unequal and dissimilar, both as to dimension and quality. That on the westward is *Proper* or *European* Russia; and that lying to the east side, *Asiatic* Russia, or *Siberia*.

European Russia extends, by the final partition of Poland, from the river Dneister to the Uralian mountains, the grand chain which, as we have just said, divides Europe from Asia; in length about 1600 miles, and in breadth above 1000 English miles. The extent is computed at about 1,200,000 square miles. For a further account of *Asiatic* Russia, see *SIBERIA*.

Russia Company. See *COMPANY*.

Russian Music, in the Church. See *GREEK Church*.

Russian Secular Music. The only instruments known in Russia till the time of Peter the Great, were such as the peasants still use in the provinces, which are described in the Gotha Almanac, and in Guthrie's Dissertations, with drawings. Peter had at first only such military instruments as he had seen in Germany. But the first good music that was heard in Russia, was brought thither by duke Charles Frederic of Holstein-Gottorp, at Petersburg. This prince, destined to marry the princess Anne Petrovna, daughter of Peter, had a complete band, or chapel, as the Germans call it, in his suite, composed of twelve good German musicians: the concerts by this band were new and acceptable to all the great Russian nobility, who had never heard any other music than that of the natives, which was coarse and barbarous. The emperor himself used to frequent these concerts, and established two regular performances in his palace each week, employing the German musicians to teach the boys about the court, and in the army.

All the successors of Peter have followed his example as a model in this instance, as in all others.

The empress Anne, the niece and successor of the great Peter in 1730, who died in 1740, early in her reign first regaled Petersburg with an Italian opera composed by Araja, a native of Italy, of some eminence, whom she appointed her maestro di cappella; and who likewise composed intermezzi to Italian words, and in the musical style of his country. Concerts twice a-week, which had been established at court, have been continued ever since. All the grandees of Russia imitated this example, had private concerts in their mansions, and many of them became dilettante performers themselves in a high form of excellence.

The empress Elizabeth, daughter of Peter, began her reign in 1741, by a revolution which set aside the czar Ivan as incapable of reigning. She had been affianced, in 1747, to the duke of Holstein-Gottorp; but that prince dying before the marriage took place, she passed the rest of her days in a single state. This princess, on whom nature had bestowed a nice discriminating ear, with a passion for music and all the fine arts, by her patronage caused them to flourish in her dominions, in a way superior to most of the other states of Europe. She built an opera-house at Moscow, capable of containing 5000 people. At her coronation, "La Clemenza di Tito," written by Metastasio, and set by Halle, was performed by the best Italian singers of the time; and a prologue to this drama, entitled "La Russia afflitta e consolata," was set by Araja, maestro di cappella to the court of Petersburg. Soon after this, Petersburg first heard an opera in the Slavonian language, set likewise by Araja.

Such was the progress which music had made in Russia, when Peter Federowitz, consort to the empress Catharine, was called to the throne as presumptive heir. The passion which this prince had for music contributed considerably to its further advancement into favour in his dominions. He performed himself on the violin sufficiently to bear a part in a symphony. If he now and then played a wrong note, or missed a difficult passage, the Italian musicians were too polite to notice it; on the contrary, they persuaded his imperial majesty that he had a particular talent for music, and that his performance on the violin was perfect. Music became his favourite, and almost sole amusement, even to a degree of enthusiasm. He became also a great connoisseur in violins; and, in a short time, purchased a great collection of those made by the most celebrated artists, particularly those of Cremona, by Amati, Straduaris, Guarnerio, &c. and by Steiner and Albani, Germans. He was never more happy than when at the head of his band in his concerts. He intended assembling at his court all the great musicians in Europe, and he would doubtless have succeeded, if his reign had been more durable; but aiming at more important revolutions in his state (which, happily for his country, were lost), a termination was put at once to his musical and political projects.

Catharine II. mounted the throne, attended not only by all the sciences and fine arts, but by the genius of legislators and victory. The state, the church, public order, industry, commerce, maritime force, and the state of her army, had her first attention.

After having provided for the faste and power of her empire, she attended to its embellishment by means of the fine arts: and erected a temple to painting, sculpture, architecture, and formed an imperial academy of sciences and beaux arts at Petersburg.

After this latter establishment, which has since become so illustrious, she turned her thoughts to music, and called to

her court from Venice the celebrated Baldassar Galuppi, detto Il Buranello, the most fertile and spirited composer of his time. His "Didone abbandonata," in which the Gabrielle performed the part of Dido, had such prodigious success, that, after the first representation, the empress, with her own hands, presented the composer with a magnificent box filled with pieces of gold: telling him that "the unfortunate Dido, when she expired, bequeathed it as a legacy to the illustrious Buranello."

Those who recollect the turn which this princess gave to her munificence in the purchase of Diderot's library, will be less surpris'd at her liberality to Buranello. Diderot, in his latter years, being constrained to offer his library to sale, unsuccessfully, to the principal sovereigns in Europe, in order to enable him to educate his only daughter, when his wish was communicated to the empress Catharine, she said, "she would willingly purchase his library of him at his own price, upon condition that he would be so obliging as to take care of it as long as he lived; and in order to improve it, and to keep pace with the times, she hoped that he would take the trouble to lay out for her 2000 rubles a-year in the purchase of new books."

Buranello was succeeded at Petersburg by Tractta, an excellent composer; and the compositions of these great masters, sung by the finest voices of Italy, and accompanied by the best instrumental performers with which the orchestra could be supplied, together with the taste and magnificence of the decorations, and the splendour of the dances, rendered the opera at Petersburg the most brilliant and renowned spectacle in Europe.

When the empress and her son, the grand duke, had so happily recovered of the small-pox, by the inoculation of baron Dimsdale, the agreeable French comic opera of "Annette and Lubin" was performed by the principal nobility of the court; however, too good a taste in singing and in dramatic music was formed at Petersburg now, for the vocal performers of France to captivate much, even with the compositions of Duni, Monfigni, Philidor, and Gretry, which were tried for one season.

It is to sacred music that the lyric theatre at Petersburg is obliged for the great effects of its chorusses. In the opera of "Ifigenia in Tauride," set by Galuppi, he was allowed to make use of the choral singers of the imperial chapel. Of which permission that great master availing himself, composed chorusses for ten choirs, in four parts each, which had a most surpris'ing effect. See CHACE.

After the period described by the Gotha Almanac for 1772, the opera of Petersburg had Pacsiello and Sarti to compose. Pacsiello, after three years residence in Russia, where his compositions and personal merits were perfectly understood, and treated with great admiration and regard, was succeeded by Sarti, who went to Petersburg in 1784, for three years, but remained in Russia till 1790; during which time he established a concert spirituel, or oratorio, for which he composed music *à cappella*, in which he introduced instruments which are not allowed in the Greek church. He likewise composed a Te Deum for the victory obtained over the Turks by the Russians at Oczzakow, and established a conservatorio for the education of young musicians in the Neapolitan manner, of which he was appointed director. With his opera of "Armida" the empress was so pleased, that she gave him a golden vase, and a ring of great value. See SARTI.

Music is still patronized in Russia; concerts and operas are supported in the usual magnificent manner (1805); and the Italian taste, besides its prevalence at the opera and court

concerts to Italian words, is propagated in the church and provinces by national composers, who had been sent to Italy by the empress Catharine to study composition, and who, when they returned, set hymns, motets, and songs in the Slavonian language, which is said to be nearly as soft and capable of receiving melody as the Italian. Palcha, Lolli, Giornovich, Bortnianiki, Dietz, &c. contributed to refine instrumental music in Russia.

RUSSING, in *Geography*, a town of Austria; 6 miles E. of St. Polten.

RUSSEWILL, a town of Switzerland, in the canton of Lucerne; 6 miles W. of Lucerne.

RUST, FREDERIC WILLIAM, in *Biography*, born in 1739, music-director at Dessau. His first instrument was the violin, then the harpsichord; but he seems to have played and written for all kinds of instruments, though chiefly for the harpsichord. He published at Leipzig six sonatas for that instrument, and twenty-four variations to a German song, at Dessau, 1782; with many detached songs and odes for periodical works.

RUST, in *Geography*, a town of Hungary, the inhabitants of which carry on a considerable trade in wine, made nearly as strong as Tokay; 4 miles E.N.E. of Edenburg.—Also, a small island in the North sea, about 60 miles from the coast of Norway. N. lat. 67° 5'.

RUST, in *Rural Economy*, a distemper incident to corn, and generally called mildew. (See MILDEW. See also BLIGHT, and SMUT.) The ancients generally thought that it came from heaven, being ignorant of its true cause. Virgil gives this up as an incurable distemper, and tells the farmer, that if his corn is blighted he must live upon acorns, not supposing that any remedy could be devised for such a distemper. These people in general, having no true knowledge of the theory of husbandry, had recourse to magic, and used what they thought spells and enchantments on all occasions. Cato, Varro, and even Columella, are full of these ridiculous devices. A better knowledge in the real nature of husbandry has taught us to understand this matter in a very different manner, and to apply more efficacious remedies to it.

Wheat is blighted at seasons, first in the blossom, and then its generation is prevented, many of the husks being empty in the ear, and the rudiments of the grains not impregnated; secondly, wheat is blighted when the grains are brought to maturity; and in this case they become light, and are of little value for making of bread, having scarcely any flour in them.

Under this term of rust may, perhaps, most properly be arranged, and included, that sort of destructive affection of grain, which is caused by the funguses and parasitical plants, which fix themselves on, and attach themselves to, the stems or other parts of it, so as to diminish, intercept, or destroy its nutritive properties and qualities. The injury done in this way is often more dreadful than that from any of the other causes, as whole fields have been known to be utterly destroyed, so as not to contain a single grain of wheat in the ear, and, at the same time, the straw rendered totally unfit for fodder, as being little better than a *caput mortuum*, possessing neither strength nor substance in it. The evidence of different places fully confirm the existence of fungi, as injurious in this manner; as from some it is stated, that, as the wet weather continued, the rust or fungus made a rapid progress from the ear downwards, until, in many instances, it covered the stem from the ear, as far as it was unsheathed. From others it is said, that the rust or fungus prevented those grains which the maggot had not destroyed from being perfected, in a greater or less degree. From still others it

is asserted, that these parasitical plants multiplied so much upon the straw, and on the husk and chaff of the ears, that, in many cases, whole fields put on an universal blackened, rusty appearance. From different other persons, various other circumstances of this nature are also related to be met with.

The best means of preventing and removing affections of this nature in this sort of grain crop, are supposed to be those of cultivating only the sorts of wheat which are the hardiest in point of quality, and the least liable to disease; the sowing of the wheat earlier than usual in the season; the introduction of earlier varieties of it; the giving of a sufficient quantity of feed; the draining of the land where it is inclined to be wet; the rolling and treading of the land by live-stock immediately after sowing; the use of sowing different sorts of saline substances as a manure; the proper regulation and improvement of the course of crops; the change of feed, by bringing it fresh from other countries; the extirpation of the diseased stems, stalks, or blades early in the season; and the instantly cutting down of the crop when it is decidedly affected. See ROTATION of CROPS, SALINE Manure, TREADING, and WHEAT.

It is supposed, that, by means of one or other of these methods, when properly improved and applied by ingenious naturalists and farmers, there can be no doubt but that this, as well as the other diseases in wheat crops, may, in a great measure, be either wholly remedied, or their effects be so far reduced as to be of little national consequence. Sir John Sinclair's Inquiry into the Blight, Rust, and Mildew in Wheat.

The rust or mildew also attacks, and is highly injurious to many sorts of garden vegetables as well as fruit-trees, such as those of late peas, &c. and peach-trees, &c.

On the supposition of the disease, in these cases, arising from the seeds of fungi, and to be promoted immediately afterwards, and in continuance, by the want of a sufficient supply of moisture from the soil or ground, with an excess of humidity in the air, particularly when the plants are exposed to a temperature below that to which they have been accustomed; the president of the Horticultural Society of London was led to pursue the following mode of cultivation with the late autumnal crops of the pea, by which the table may be as abundantly supplied during the month of September and that which succeeds it, as in those of June and July; and the plants be nearly as free from the disease. The ground is first dug up in the usual manner, and the spaces which are to be occupied by the future rows of peas then well soaked with water. After which, the mould upon each side is collected together, so as to form ridges seven or eight inches above the previous level of the surface of the ground, which are also well watered. The seed-peas are then sown, in single rows, along the tops of the ridges. The plants quickly shew themselves above the surface of the land, and grow with much vigour, on account of the great depth of stirred mould, and the abundant moisture. There is water given in rather a profuse manner, once in the course of every week or nine days, even when the weather proves showery, but if the ground should be thoroughly drenched with the water of the autumnal rains, there will be no further trouble necessary. The plants, under this mode of management, continue perfectly green and luxuriant, until their blossoms and young seed-vessels become destroyed by the frosts; and their produce will retain its proper flavour, which is constantly destroyed by this disease.

The pea, which has constantly been cultivated in this intention and manner, is a very large kind, the seeds of which are

are greatly shrivelled, and grow very high: it is now become common in the seed shops of the metropolis under the title of knight's pea. This variety is preferred on account of its more saccharine quality, and the retention of its flavour more perfectly in the autumnal season; however, it is not improbable but that any other late tall-growing variety may succeed equally well. It is the practice to sow a small quantity every ten days until about midsummer, which afford good supplies for the table until the end of October, though the severe frosts, which sometimes happen in the early part of that month, prove destructive of the more late crops.

The fame, or similar means, it is supposed, may be equally effectual in preventing this disease in the peach-tree. As it is found, that when the roots of it, which strike to the greatest depth in the soil, and which are consequently the best suited to supply the tree with moisture during the summer, are destroyed by a hurtful under soil, or by an excess of moisture in the winter season, the disease, on many varieties of the peach-tree, becomes extremely formidable. But that where, on the contrary, a deep, fertile, dry loam permits the roots to extend to their proper depth; and where the situation is not so low as to be much infested with fogs, little of this disease is met with: also in a forcing-house it has been found equally easy, by appropriate management, to introduce or prevent the appearance of it. When the mould has been kept very dry, and the air in the house damp and unchanged, the plants have soon become diseased; but when the mould has been regularly, and rather abundantly watered, not a single vestige of the disease has shewn itself.

RUST, in *Gardening*, a disease of the blight or mildew kind, which affects many sorts of crops, as well as some fruit-trees. All the later pea, bean, kidney-bean, and several other similar sorts of crops, are liable to be attacked, and greatly injured, or wholly destroyed in this way. Some kinds of the peach and other sorts of the finer fruit-trees are also much exposed to its ravages and destructive effects. See the preceding article.

RUST of a metal, the flowers or calx thereof, procured by corroding and dissolving its superficial parts by some menstruous fluid: or the earth of the metal decomposed by the action of a proper menstruum.

Water is the great instrument or agent in producing rust; the air apparently rusts bodies, but it is only in virtue of the water it contains.

Hence, in a dry air, metals remain a long time without contracting rust; and hence oils, and other fatty bodies, secure metals from rust, or from being oxydated; water being no menstruum to oil, &c. and therefore not able to make its way through it. See IRON.

All metals are liable to rust; even gold itself, though generally held incapable of it, grows rusty, if exposed to the fumes of sea-salt.

The reason why gold is so rarely found to rust is, that sea-salt, which is the only salt that will prey upon it, is of a very fixed nature; and therefore little of its effluvia, or exhalations, are found floating in the air.

Rust is usually supposed to be a corruption of the metal, but without much foundation: it is the very metal itself, only under another form; and accordingly we find, that rust of copper may again be turned into copper.

The rust of copper, called *æruo*, makes what we call *verdigris*. Ceruss is made of lead converted into rust by vinegar. Iron, in time, turns wholly into rust, unless preserved from the air by paint or varnish.

Citizen Conté has adopted a method, which he finds effectual, for preventing the oxydation of iron and steel;

or, in popular terms, to prevent iron and steel from rusting. It consists in mixing with fat oil varnish, at least half, or at most four-fifths of its quantity of highly rectified spirits of turpentine. This varnish must be lightly and evenly applied with a sponge; after which the article is left to dry in some situation not exposed to dust. He affirms that articles thus varnished retain their metallic lustre, and do not contract any spots of rust. This varnish may also be applied to copper, of which it preserves the polish, and heightens the colour. It may be employed with particular advantage to preserve philosophical instruments from any change, in experiments where, by being placed in contact with water, they are subject to lose that polish and precision of form, which constituted part of their value. *Nicholson's Journal*, vol. vi. p. 142.

Plumbago protects iron from rust, and on that account is rubbed on various ornamental cast-iron works, such as the fronts of grates, &c.

RUSTAN, in *Geography*, a town of Persia, in the province of Schirvan; 14 miles N. of Derbend.

RUSTANGUNGE, a town of Hindoostan, in Bahar; 13 miles S.W. of Patna.

RUSTBURN, in *Farming*, a term provincially used to signify the troublesome weed rest-harrow.

RUSTENBURG, in *Geography*, a town of Westphalia, in the territory of Eichsfeld, with a castle; nine miles W. of Heiligenstadt.

RUSTGADEN, a town of Sweden, in Dalecarlia; 23 miles S.S.W. of Fahlun.

RUSTI, or RUST, in *Biography*, born in 1744, was maestro di cappella, at Barcelona, in 1767. He studied in the conservatorio of La Pietà at Naples, and afterwards under Rinaldo di Capua. His first opera, "La Contadina in Ceste," was composed for Venice in 1764. He went from Venice to Barcelona, where he composed "l'Idolo Cinese," in 1774, "Amor Bizzazzo" in 1775, and "Alessandro nell' Indie," the same year. "Il Baron di terra asciutta," 1776; "Il Socrate Immaginario," 1776; "Il Giove Immaginario;" "Il due protetti," 1777. His operas were much esteemed in Italy.

RUSTIC GODS, *Dii Rustici*, in *Antiquity*, were the gods of the country, or those who presided over agriculture, &c. Varro invokes the twelve *dii consentes*, as the principal among the rustic gods; *viz.* Jupiter, Tellus, the Sun, Moon, Ceres, Bacchus, Rubigus, Flora, Minerva, Venus, Lympha, and Good Luck. Besides these twelve arch-rustic gods, there was an infinity of lesser ones; as Pales, Vertumnus, Tutelina, Fulgor, Sterculius, Mellona, Jugatinus, Collinus, Vallonia, Terminus, Sylvanus, and Priapus. Struvius adds the Satyrs, Fauns, Sileni, Nymphs, and even Tritons; and gives the empire over all the rustic gods to the god Pan.

RUSTIC, in *Architecture*, expresses a manner of building in imitation of simple or coarse nature, rather than according to the rules of art.

RUSTIC *Fasti*. See FASTI.

RUSTIC *Fountain*. See FOUNTAIN.

RUSTIC *Freeze*. See FREEZE.

RUSTIC *Quoins*, by Vitruvius called *lapides minant* &c. See RUSTIC QUOIN.

RUSTIC *Services*. See SERVICE.

RUSTIC *Work* is where the stones in the face, &c. of a building, instead of being smooth, are hatched or picked with the point of an instrument.

RUSTICS, *Regular*, are those in which the stones are chamfered off at the edges, and form angular or square

cesses of about an inch deep at their jointings, or beds, and ends.

RUSTIC Order, is an order decorated with rustic quoins, rustic work, &c.

Felbien says, it is properly where the several parts of the five orders are not exactly observed; but this confounds rustic with Gothic.

RUSTICI, FRANCESCO, in *Biography*, a native of Sienna, born about 1595, was a disciple of Francesco Vanni. His taste led him afterwards to adopt the style and subjects of Caravaggio. A dying Magdalen in the gallery at Florence, and a Sebastian in the Borghese palace at Rome, are in that manner, though with more selection of form. He studied at Rome the works of a Caracci and Guido, not, however, to the loss of his own peculiar style. His most renowned work is the Annunciation, at Sienna. He died in the prime of life, in 1625.

RUSTICIANA, in *Ancient Geography*, a town of Hispania, in Lusitania, on the left bank of the Tagus, to the E. of Norba-Cæsarea, and W. of Augusto-Briga.

RUSTICOLA, in *Ornithology*, a species of *Scolopax*; which see.—Also, a species of *tringa*. See *TRINGA Calidris*.

RUSTICULA, a name by which Aldrovand, and some other authors, have called the godwit, more commonly known by the name *agocephalus*. See *SCOLOPAX Egocephala*.

RUSTICULA *Brasiliensis*, the name given by Mr. Ray, and some others, to the guaranna, a water-bird of the Brasils, of the size of our snipe. See *SCOLOPAX Guaranna*.

RUSTONIUM, in *Ancient Geography*, a town of Africa, on the coast of Mauritania Cæsariensis, between the river Savus and the town of Ruficibar, according to Ptolemy. It is called Rufconia Colonia by Pliny; Rungonia Colonia by Antonine; and according to Livy, the Africans called it Rufcinona.

RUSTRE, in *Heraldry*, a bearing of a diamond shape, pierced through in the middle with a round hole.

RUSUBESER, TACKSIBT, in *Ancient Geography*, a town of Africa, upon the coast of Mauritania Cæsariensis, according to Ptolemy, situated to the E. of Rufucurium, between Ionnyum and Rufazus.

RUT, in *Hunting*, &c. a term used for the venery or copulation of deer.

For the terms which obtain in respect of this and other beasts of game, with the noise they make during the acts, see HUNTING.

The rutting-time with the hart begins about the middle of September; and holds two months: the older they are the better, and the more beloved they are by the hinds, and the earlier do they go to rut. At this time they will turn head, and furiously make at any living creature. It is easy killing them at this time; their whole business being to feent and pursue the track of the females; scarcely feeding at all. The young herd are forced to fly with great precipitancy, when the hart comes in sight of his mate. If there be any other of bulk, they will dispute it very hotly with their horns. As the season expires, they withdraw, and dig themselves holes in which to lie to assuage the strong fervour of their lust: when become a little sweet, they return to their pasture, and live in herds.

The rutting or touring time of the roe-buck begins in October, and lasts only twelve or fifteen days. When this is past, he casts his horns.

After the hind is filled, she keeps no more company with the male till she be delivered. But the doe always accompanies her paramour till her time approaches, when she re-

tires, for the safety of her young, which he would otherwise kill.

RUT, in *Rural Economy*, a track or narrow opening formed in a road by the wheel of a cart or other carriage, which has but little breadth. Ruts of this sort are often dangerous and troublesome, when they become of any considerable depth; therefore they frequently stand in need of being filled in and rendered even with the other surface. In order to do this with the best effect, the sides of them require to be well loosened with the point of a pick, that a firm bed may be given to the fresh stones which are put in, and at the same time, the protuberances about them, if there should happen to be any, may be chipped off and removed. And still further to prevent the fresh stones from being displaced, it is necessary that they should be covered in with part of the loosened or other materials, and the whole firmly rammed down, or otherwise driven in, so as to give the part, thus put in order, not only the evenness of surface, but, as much as possible, the firmness of the rest of the road. This sort of accuracy may be readily attained by a little practice and experience.

All the minor ruts, depressions, and dimples or hollows in roads which are of any consequence, should always be made up and secured in the same manner, as no water should ever be suffered to stand on any part of the surface of them.

An implement of the three-pointed pick kind is often found extremely useful and convenient in trimming and filling in ruts in this way, as well as for rendering the surface even and regular. See PICK.

RUT of the Sea, is where it dashes against any thing.

RUTA, in *Botany*, an ancient Latin name, *ῥῦτον* of the Greeks, which lexicographers derive from *ῥῦω*, to flow, in allusion to some reputed expelling qualities of the plant. The word is rather perhaps, as De Theis observes, not capable of explanation, being nearly the same in all the most ancient European languages; *ruz* in Runic; *rude*, *ruta*, or *rutu*, in Anglo-Saxon; *rutiza* in Selavonian. Hence it is *rue* in English and French; *ruta* in Italian; *ruda* in Spanish and Portuguese; *raute* in German; *rhy'w* in Welsh. *ῤηγανος*, a Greek synonym of *ῥῦτον*, is derived from *πηγυρω*, to congeal or repress; and supposed to refer to a quality in the plant, opposite, in some respects, to the above-mentioned. This latter name is used by Linnæus for a genus nearly akin to *Ruta*; see PEGANUM. If etymology were a sure guide to the virtues of plants, rue might be taken by monks, who wish to keep their vows, and by nuns, who have broken theirs. But we believe its efficacy, in either case, as uncertain, as the object is unworthy of consideration.—Linn. Gen. 210. Schreb. 286. Willd. Sp. Pl. v. 2. 542. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 34. Sm. Prodr. Fl. Græc. Sibth. v. 1. 271. Juss. 297. Tourn. t. 133. Lamarck Illustr. t. 345. Gærtn. t. 111.—Class and order, *Decandria Monogynia*. Nat. Ord. *Multifloræ*, Linn. *Rutaceæ*, Juss.

Ruta, Gen. Ch. Cal. Perianth inferior, in five deep segments, short and permanent. Cor. Petals five, spreading, nearly ovate, concave, with narrow claws. Stam. Filaments ten, awl-shaped, spreading variously, the length of the corolla, broadish at the base; anthers incumbent, simple, very short. Pist. Germen gibbous, cut crosswise, surrounded with ten melliferous pores at the base, and raised on a receptacle pierced with as many similar pores; style central, erect, awl-shaped; stigma simple. Peric. Capsule gibbous, five-lobed half way down, of five cells, bursting elastically at the summit of each lobe. Seeds numerous, rough, angular, somewhat kidney-shaped.

Obs.

Obf. *R. graveolens*, and some others, in all except the primary flowers, exclude one-fifth of every part of the fructification. In *R. chalepensis* the petals are fringed at the base.

Eff. Ch. Calyx in five deep segments. Petals concave, Receptacle surrounded with ten honey-bearing pores. Capsule lobed. Seeds numerous. Anthers simple.

1. *R. graveolens*. Common Rue. Linn. Sp. Pl. 548. Willd. n. 1. Ait. n. 1. Bulliard Herb. t. 85. (Ruta; Matth. Valgr. v. 2. 95. *R. hortensis*, et *montana*; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets oblong; the terminal one obovate. Petals entire.—Native of the south of Europe. Frequent in the islands of the Archipelago. A hardy shrub, cultivated, time out of mind, in our gardens, where it flowers from June to September, and propagates itself spontaneously by seed. The stem is bushy, rising to the height of several feet, round, smooth, branched. Leaves alternate, stalked, twice or thrice compound, smooth, of a deep blueish glaucous hue; their leaflets oblong or obovate, entire, tapering at the base. Stipules none. Flowers of a rather dull yellow, copious, in terminal corymbose panicles; the terminal ones only having the full number of each of the parts of fructification, while the rest are octandrous and four-cleft. Petals jagged at the extremity; angular, but not fringed, at the base. The stamens of this, and perhaps all the other species, are remarkable for their progressive approach to the stigma, over which they in turn drop their pollen and retire. Every part of the plant when rubbed, or touched, has a peculiar acrid pungent smell, too strong to be agreeable. The bruised leaves excoriate the lips and nostrils, if incautiously applied, as they often are, to counteract bad smells; rue being supposed powerfully to prevent contagion. Its internal use is unsafe; yet we have known it eaten with bread and butter in no small quantity; not altogether with impunity. Botanists distinguish two varieties; the wild, which has more oblong leaflets, or segments, and the garden rue, which has rounder ones. Gerarde has transposed the cuts of these, borrowed from Dodonæus.

2. *R. montana*. Mountain Rue. Ait. n. 2. Willd. n. 2. (*R. legitima*; Jacq. Ic. Rar. t. 76. *R. sylvestris*; Camer. Epit. 495. *R. sylvestris minima*; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets all linear. Branches of the panicle racemose. Petals entire.—Native of dry hilly situations in the south of Europe. Dr. Sibthorp found this species in various parts of Greece, and the neighbouring countries, and justly considered it as the *πικραλίς*, or Mountain Rue of Dioscorides, for which most of the commentators of that old writer have mistaken the wild, or narrower-leaved, *R. graveolens*. This is a hardy perennial herb, rather than a shrub, flowering in autumn in our gardens, where, however, though cultivated by Gérarde, it is now rarely to be seen. The plant is known by its more humble stature, and especially by the very narrow leaflets. The radical leaves are crowded into a dense tuft. Most of the flowers are four-cleft, as in the former. The branches of the panicle are racemose, and elongated. Capsule not half so big as in the Common Rue.

3. *R. chalepensis*. African Rue. Linn. Mant. 69. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 368. (*R. tenuifolia*, florum petalis villis fœtentibus; Morif. scēt. 5. t. 35.)—Leaves repeatedly compound; leaflets oblong or obovate. Petals with fringe-like teeth.—Native of Africa, as well as of Zante, and the isles of the Archipelago. A common greenhouse shrub, flowering at various seasons, and chiefly distinguished from the Common Rue by its larger flowers, whose petals are copiously fringed with taper teeth. Many

of the flowers are four-cleft, and the foliage varies in breadth, as in that species.

4. *R. pinnata*. Wing-leaved Rue. Linn. Suppl. 232. Willd. n. 4. Ait. n. 4.—Leaves simply pinnate; leaflets lanceolate, tapering at the base, bluntly serrated. Petals somewhat notched.—Native of rocks in the Canary islands, from whence it was brought by Mr. Masson to Kew, in 1780. This is a greenhouse shrub, flowering in spring and summer. It is very distinct from all the foregoing, resembling the first in size and inflorescence, but the flowers are smaller, with crenate, or slightly toothed, petals. The leaves are very different, composed of two or three pair of opposite leaflets, above an inch long, various in breadth, more or less obtuse, with unequal blunt serratures; the odd one rather the largest, on a long stalk.

5. *R. patavina*. Three-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 5. Sm. Fl. Græc. Sibth. t. 369, unpublished. (*Pseudo-ruta patavina trifolia*, floribus luteis umbellatis; Mich. Gen. 22. t. 19.)—Leaves ternate, sessile. Stamens hairy. Germen crested.—Originally discovered by Micheli on a hill near Arqua, not far from Padua. Dr. Sibthorp met with it on mount Parnassus. Linnæus had no specimen, nor is the plant known in our gardens, so that it seems not to have fallen in the way of many botanists. The root is woody and perennial. Stems several, a foot high, erect, round, downy, leafy, branched at the base only. Leaves numerous, downy, of a light, rather glaucous green, alternate, sessile, each composed of three, nearly equal, narrow, obtuse, entire, slightly revolute leaflets, about an inch long. Flowers five-cleft, in a terminal, dense, cymose panicle. Calyx hairy, spreading. Petals ovate, obtuse, entire, of a pale dull yellow, with a green central rib. Stamens ten, not so long as the petals; their filaments hairy half way up. Germen five-lobed, covered with glandular tubercles, and crowned with numerous oblong, notched, crest-like, leafy scales.

6. *R. linifolia*. Broad Flax-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 6. Ait. n. 5. Andr. Repof. t. 565. Sm. Fl. Græc. Sibth. t. 370, unpublished. (*R. sylvestris linifolia hispanica*; Bocc. Mus. v. 1. 82. t. 73. f. 3. Barrel. Ic. t. 1186. *R. montana*, foliis integris subrotundis; Buxb. Cent. 2. 30. t. 28. f. 2.)—Leaves simple, obovate. Stamens hairy. Germen without a crest.—Native of Spain, Cyprus, and various parts of Greece. The plant of Buxbaum, gathered by him in fields, after harvest, near Rodostro, in Thrace, as far as can be discerned from his imperfect figure, does not deserve to be considered as even a variety. This agrees with the last in general habit, but is more robust, the flowers more numerous, and of a deeper yellow. Leaves much broader, less glaucous, and all simple and solitary. Stamens much dilated, and very hairy, in their lower part. Germen roundish, five-lobed, ten-furrowed, rough with small granulations, but entirely destitute of the leafy crest, which, though so remarkable in *R. patavina*, is not expressed by the generally exact Micheli. The name of *linifolia*, usually alluding to the Common Flax, is not well adapted to the plant we have been describing, except we understand it as referring to some of the broad-leaved yellow species of *Linum*, between which and this *Ruta* there exist indeed many points of resemblance.

7. *R. fruticulosa*. Narrow Flax-leaved Rue. Labillard. Syr. fasc. 1. 13. t. 4. Willd. n. 7. (*R. orientalis*, linariz folio, flore parvo; Tourn. Cor. 19. Buxb. Cent. 2. 30. t. 28. f. 1.)—Leaves simple, ovato-lanceolate. Clusters corymbose, of few flowers. Stamens hairy at the base. Germen hairy, without a crest.—Gathered in Syria, near Damascus, by our worthy friend M. Labillardiere, to whom

cesses of about an inch deep at their jointings, or beds, and ends.

RUSTIC *Order*, is an order decorated with rustic quoins, rustic work, &c.

Felbien says, it is properly where the several parts of the five orders are not exactly observed; but this confounds rustic with Gothic.

RUSTICI, FRANCESCO, in *Biography*, a native of Sienna, born about 1595, was a disciple of Francesco Vanni. His taste led him afterwards to adopt the style and subjects of Caravaggio. A dying Magdalen in the gallery at Florence, and a Sebastian in the Borghese palace at Rome, are in that manner, though with more selection of form. He studied at Rome the works of a Caracci and Guido, not, however, to the loss of his own peculiar style. His most renowned work is the Annunciation, at Sienna. He died in the prime of life, in 1625.

RUSTICIANA, in *Ancient Geography*, a town of Hispania, in Lusitania, on the left bank of the Tagus, to the E. of Norba-Cæsarea, and W. of Augusto-Briga.

RUSTICOLA, in *Ornithology*, a species of *Scolopax*; which see.—Also, a species of *Tringa*. See *TRINGA Calidris*.

RUSTICULA, a name by which Aldrovand, and some other authors, have called the godwit, more commonly known by the name *agocephalus*. See *SCOLOPAX Agocephala*.

RUSTICULA *Brasiliensis*, the name given by Mr. Ray, and some others, to the guaraua, a water-bird of the Brasils, of the size of our snipe. See *SCOLOPAX Guaraua*.

RUSTONIUM, in *Ancient Geography*, a town of Africa, on the coast of Mauritania Cæsariensis, between the river Savus and the town of Ruficibar, according to Ptolemy. It is called Rufconia Colonia by Pliny; Rungonix Colonia by Antonine; and according to Livy, the Africans called it Rufcinona.

RUSTRE, in *Heraldry*, a bearing of a diamond shape, pierced through in the middle with a round hole.

RUSUBESER, TACKSIBT, in *Ancient Geography*, a town of Africa, upon the coast of Mauritania Cæsariensis, according to Ptolemy, situated to the E. of Rufucurium, between Iomnyum and Rufazus.

RUT, in *Hunting*, &c. a term used for the venery or copulation of deer.

For the terms which obtain in respect of this and other beasts of game, with the noise they make during the acts, see HUNTING.

The rutting-time with the hart begins about the middle of September; and holds two months: the older they are the better, and the more beloved they are by the hinds, and the earlier do they go to rut. At this time they will turn head, and furiously make at any living creature. It is easy killing them at this time; their whole business being to scent and pursue the track of the females; scarcely feeding at all. The young herd are forced to fly with great precipitancy, when the hart comes in sight of his mate. If there be any other of bulk, they will dispute it very hotly with their horns. As the season expires, they withdraw, and dig themselves holes in which to lie to assuage the strong fervour of their lust: when become a little sweet, they return to their pasture, and live in herds.

The rutting or touting time of the roe-buck begins in October, and lasts only twelve or fifteen days. When this is past, he casts his horns.

After the hind is filled, she keeps no more company with the male till she be delivered. But the doe always accompanies her paramour till her time approaches, when she re-

tires, for the safety of her young, which he would otherwise kill.

RUT, in *Rural Economy*, a track or narrow opening formed in a road by the wheel of a cart or other carriage, which has but little breadth. Ruts of this sort are often dangerous and troublesome, when they become of any considerable depth; therefore they frequently stand in need of being filled in and rendered even with the other surface. In order to do this with the best effect, the sides of them require to be well loosened with the point of a pick, that a firm bed may be given to the fresh stones which are put in, and at the same time, the protuberances about them, if there should happen to be any, may be chipped off and removed. And still further to prevent the fresh stones from being displaced, it is necessary that they should be covered in with part of the loosened or other materials, and the whole firmly rammed down, or otherwise driven in, so as to give the part, thus put in order, not only the evenness of surface, but, as much as possible, the firmness of the rest of the road. This sort of accuracy may be readily attained by a little practice and experience.

All the minor ruts, depressions, and dimples or hollows in roads which are of any consequence, should always be made up and secured in the same manner, as no water should ever be suffered to stand on any part of the surface of them.

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Gen. Ch. *Cal.* Perianth inferior, in five deep segments, short and permanent. *Cor.* Petals five, spreading, nearly ovate, concave, with narrow claws. *Stam.* Filaments ten, awl-shaped, spreading variously, the length of the corolla, broadish at the base; anthers incumbent, simple, very short. *Pist.* Germen gibbous, cut crosswise, surrounded with ten melliferous pores at the base, and raised on a receptacle pierced with as many similar pores; style central, erect, awl-shaped; stigma simple. *Peric.* Capsule gibbous, five-lobed half way down, of five cells, bursting elastically at the summit of each lobe. *Seeds* numerous, rough, angular, somewhat kidney-shaped.

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of the flowers are four-cleft, and the foliage varies in breadth, as in that species.

4. *R. pinnata*. Wing-leaved Rue. Linn. Suppl. 232. Willd. n. 4. Ait. n. 4.—Leaves simply pinnate; leaflets lanceolate, tapering at the base, bluntly serrated. Petals somewhat notched.—Native of rocks in the Canary islands, from whence it was brought by Mr. Masson to Kew, in 1780. This is a greenhouse shrub, flowering in spring and summer. It is very distinct from all the foregoing, resembling the first in size and inflorescence, but the flowers are smaller, with crenate, or slightly toothed, petals. The leaves are very different, composed of two or three pair of opposite leaflets, above an inch long, various in breadth, more or less obtuse, with unequal blunt serratures; the odd one rather the largest, on a long stalk.

5. *R. patavina*. Three-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 5. Sm. Fl. Græc. Sibth. t. 369, unpublished. (*Pseudo-ruta patavina trifolia*, floribus luteis umbellatis; Mich. Gen. 22. t. 19.)—Leaves ternate, sessile. Stamens hairy. Germen crested.—Originally discovered by Micheli on a hill near Arqua, not far from Padua. Dr. Sibthorp met with it on mount Parnassus. Linnæus had no specimen, nor is the plant known in our gardens, so that it seems not to have fallen in the way of many botanists. The root is woody and perennial. Stems several, a foot high, erect, round, downy, leafy, branched at the base only. Leaves numerous, downy, of a light, rather glaucous green, alternate, sessile, each composed of three, nearly equal, narrow, obtuse, entire, slightly revolute leaflets, about an inch long. Flowers five-cleft, in a terminal, dense, cymose panicle. Calyx hairy, spreading. Petals ovate, obtuse, entire, of a pale dull yellow, with a green central rib. Stamens ten, not so long as the petals; their filaments hairy half way up. Germen five-lobed, covered with glandular tubercles, and crowned with numerous oblong, notched, crest-like, leafy scales.

6. *R. linifolia*. Broad Flax-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 6. Ait. n. 5. Andr. Repof. t. 565. Sm. Fl. Græc. Sibth. t. 370, unpublished. (*R. sylvestris linifolia hispanica*; Boec. Mus. v. 1. 82. t. 73. f. 3. Barrel. Ic. t. 1186. *R. montana*, foliis integris subrotundis; Buxb. Cent. 2. 30. t. 28. f. 2.)—Leaves simple, obovate. Stamens hairy. Germen without a crest.—Native of Spain, Cyprus, and various parts of Greece. The plant of Buxbaum, gathered by him in fields, after harvest, near Rodostro, in Thraee, as far as can be discerned from his imperfect figure, does not deserve to be considered as even a variety. This agrees with the last in general habit, but is more robust, the flowers more numerous, and of a deeper yellow. Leaves much broader, less glaucous, and all simple and solitary. Stamens much dilated, and very hairy, in their lower part. Germen roundish, five-lobed, ten-furrowed, rough with small granulations, but entirely destitute of the leafy crest, which, though so remarkable in *R. patavina*, is not expressed by the generally exact Micheli. The name of *linifolia*, usually alluding to the Common Flax, is not well adapted to the plant we have been describing, except we understand it as referring to some of the broad-leaved yellow species of *Linum*, between which and this *Ruta* there exist indeed many points of resemblance.

7. *R. fruticulosa*. Narrow Flax-leaved Rue. Labillard. Syr. fasc. t. 13. t. 4. Willd. n. 7. (*R. orientalis*, linariz folio, flore parvo; Tourn. Cor. 19. Buxb. Cent. 2. 30. t. 28. f. 1.)—Leaves simple, ovato-lanceolate. Clusters corymbose, of few flowers. Stamens hairy at the base. Germen hairy, without a crest.—Gathered in Syria, near Damascus, by our worthy friend M. Labillardiere, to whom

whom we are obliged for a specimen. This species is not known in gardens. The *stem* is shrubby, a span high, much branched, particularly from the base, round, downy, leafy. *Leaves* scattered, sessile, downy, about half an inch, or rather more, in length. *Flowers* small, five-cleft, yellowish, four or five together, forming short simple *clusters* at the summit of each *branch*. *Calyx* fringed with hairs, like the lower part of the *stamens*. *Germs* deeply five-lobed, clothed with fine hairs. The *petals* have short claws, more evident, as Willdenow observes, than in the preceding.

RUTA, in *Gardening*, contains plants of the under-shrubby evergreen kinds, of which the species cultivated are: the common rue (*R. graveolens*); the mountain rue (*R. montana*); the African rue (*R. chalepensis*); and the three-leaved rue (*R. patavina*).

In the first sort the varieties are; the common broad-leaved rue, the narrow-leaved rue, and the variegated-leaved rue.

And in the third kind there are varieties with broad leaves and with narrow leaves.

Method of Culture.—All the species and varieties of these plants may be readily increased by seeds, slips, and cuttings. The seed should be sown in the open ground in March or April, on a bed of light earth, raking it in: the plants soon come up, which, when two or three inches high, should be planted out in nursery-rows, and watered till fresh rooted. And from the scattered or self-sown seeds of the common sort, many young plants often rise in autumn and spring, which form good plants; but by slips or cuttings is the most expeditious method of raising all the sorts, as every slip or cutting of the young wood will readily grow. It is the only method by which the different varieties can be continued distinct. The slips or cuttings should be made from the young shoots six or eight inches long, and planted in a shady border, in rows half a foot asunder, giving a good watering, and repeating it occasionally; by which they will soon emit roots below and shoots at top, so as to form little bushy plants by the autumn following. And they all afford variety in the borders and other parts of gardens and pleasure-grounds, and the first sort and varieties are also useful medicinal plants. The third sort should have a dry soil and sheltered situation, otherwise it does not succeed well.

Some of these plants may be used for variety in the borders and other parts of pleasure-grounds, gardens, &c.

RUTA, in the *Materia Medica*. See RUE.

RUTA BAGA, in *Agriculture*, a plant of the turnip kind, which has lately been introduced into field culture with great benefit to the farmer, as affording a supply of green food for the support and fattening of sheep or other live-stock, between the common turnip and grass seasons. This root has been considered by some as a mere variety of the yellow turnip, but it is found to differ very materially from it both in texture and other properties. With respect to the top, or stem, it has something of the appearance of the rape, or cabbage kind; and the bottom, or that part of the root-bulb which is above the surface of the ground, is covered by a thick, green, tough cuticle or skin, which in some is smooth, but in others quite rough, and the internal fleshy part is of a dense, close, firm consistence, having a yellowish tinge, nearly similar to that of the horn carrot. It has indeed been suspected by some that there are two varieties of this valuable plant, the one having a *white*, and the other a *yellow* root, the latter being considered as much the best; but this seems to have arisen from their having been grown from seed collected in the neighbourhood of plants of the turnip or

cole kinds, as is fully shewn in the Surveys of the North Riding of Yorkshire and Nottinghamshire.

But the great inducements for the farmer to enter freely into the culture of this root are, according to Mr. Young, 1. If he has the right sort of seed, the root yellow in flesh, and rough in coat, it lasts through all frosts, and may be depended on for sheep quite through the month of April, though drawn two months before, and spread on a grass field. 2. It is an excellent and nourishing food for sheep, and also for any sort of cattle. 3. It is equal to potatoes, in keeping stock swine: a point of very great consequence. 4. It is, next to carrots, the very best food that can be given to horses. 5. It is sown at a season which leaves ample time, in case of a failure, to put in common turnips, or cabbages.

And in regard to the soils most proper for this root, those of the good, rich, loamy kinds are perhaps the best; but it may be grown to advantage on many of those that are too moist and heavy for the common turnip; where the land has been brought into a tolerably perfect state of pulverization and mellowness, and been well enriched with manure before the seed was put into the ground, or the plants set out upon it; as it has been perhaps from the want of this full preparation of the land, and the putting in the seed of a bad kind, and at too late a period, that cultivators of this useful root have been so frequently disappointed in obtaining good crops.

Seed.—In procuring the seed, it should always be collected from such plants as have been transplanted, and which are the most perfect of their kind, as where this is not the case, the cultivator can never be certain of having his plants of the proper sort. The writer of the East Lothian Report on Agriculture has indeed observed, that as no dependence can be placed on the seed purchased in the shops, every farmer ought to raise seed for himself: this may be done with very little trouble, and at no expence; it is only necessary that the seed-plants be carefully placed by themselves, and not allowed to be near other plants bearing flowers or seed, while they are in the same state. The danger seems to result from plants of kinds nearly related to each other mixing the farina of their flowers, when growing to feed. The ruta бага seems much liable to some adulteration of this kind, and unless farmers guard against it, by taking the trouble to preserve their own seed, they need hardly expect it genuine.

With respect to the quantity or proportion of seed that is made use of where the broad-cast method is employed, it is generally about two pounds to the acre; but where the drill plan is pursued, a somewhat smaller proportion may be sufficient: however, as it is mostly found difficult to produce a sufficient plant of this crop, it may be advisable never to be too sparing in the article of seed. In all cases new seed is to be constantly preferred, and when the season is hot and dry, it may be of utility to have it prepared by steeping a short time before sowing it.

In what regards the time of sowing, as this plant is much slower in its vegetation than that of the common turnip, it ought to be sown or put into the ground at an earlier period, by which circumstance, it will not only be more forwarded for the hoe, and more fully fixed and established in the soil, but better protected from the attacks of the fly, and the heats of the ensuing summer months. It has been the too common practice of farmers to sow this crop at the same time with that of the common turnip, by which the crops have often failed. But if put in a month or six weeks sooner, it will be found more advantageous, as from about the latter end of April to the middle of May, or perhaps a little later in the northern districts, as is shewn by the agricultural surveys of these counties. In different places different

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ferent methods are practised in raising these kinds of crops; sometimes, instead of sowing the seed over the land in either the broad-cast or drill manner, it is sown upon nursery beds of good rich earth, and after the plants are sufficiently advanced, as where they are about the size of small cabbage-plants, they are transplanted into the field, and set out on raised drills, at the distance of eight or nine inches or more from each other, and a foot or more in the rows. The business of transplanting should, if possible, be performed when the weather is in a moist state. And this may perhaps be the best mode of executing the work where such crops are cultivated only to a small extent; but where they are grown upon a more extensive scale, the former are probably to be preferred, as being more expeditious and convenient, as well as more certain of affording a sufficient plant for a full crop. From the danger of these crops being destroyed by the ravages of the fly, it has been suggested by Mr. Young, that the best culture of this plant is to sow it where it is to remain, broad-cast, from the 10th of May to the end of the month; and of all others, the best preparation to secure a crop is that of paring and burning, for the fly being the grand enemy, from its coming so very slowly to the hoe, this operation not only proves by far the best preservative against that enemy, but also pushes the plants on in an accelerated vegetation, and thereby doubly secures the crop. If the seed cannot be thus put in on land so prepared, the next best management is, to sow it after common turnips sown on the land by sheep. If neither method suits, it must be put in on well pulverized soil, very amply manured.

On a well cultivated farm near Hampstead, in the county of Middlesex, the method of culture and expences attending it were these.

Expences of Cultivation of an Acre of Land.

	£	s.	d.
Three ploughings, at 10s.	-	-	1 10 0
Three harrowings, at 5s.	-	-	0 15 0
Cleaning by hand-picking	-	-	0 10 0
Making up drills	-	-	0 5 0
Dung and labour of putting it in, half only } allowed to this crop	-	-	2 10 0
Covering it up in drills	-	-	0 5 0
Seed 2lb.	-	-	0 7 6
Drilling in ditto	-	-	0 1 0
Horse-hoeing twice	-	-	0 1 8
Hand-hoeing twice	-	-	0 12 0
Moulding up rows	-	-	0 1 0
	6	18	2

And in this mode the crop was very good, being capable of being sold in 1806 at 12*l.* per acre; the turnips averaging about five pounds weight each, and a large portion rising as high as twelve. The crop was put in upon land that had previously borne winter tares. And under this management the cultivator has no doubt of raising still larger crops.

After-culture.—It is evident, that in the after-culture of this plant, from its advancing more slowly to the hoe, that it must require greater attention to keep it clean and free from weeds than that of the common turnip. The business of hoeing, both in the horse and hand methods, must therefore be more diligently practised, repeating the operations as often as may be sufficient for the purpose, keeping the mould constantly well broken down, and applied to the roots of the plants.

And the plants of the Swedish turnip are liable to be af-

fectcd by the same causes as those of the common turnip, the fly especially, being equally, if not more prejudicial to these crops than those of the common turnip kind. And besides, they are apt to be greatly injured or destroyed by rabbits, hares, and different sorts of birds, both in their tops and roots.

It may be noticed, that there is much difference in the statements in regard to the amount of the produce in this sort of crop; but when it is put in at a sufficient early period, and the ground prepared and managed in the manner that has been stated above, it will probably in general equal, if not surpass, that of the common turnip. And when it is considered that the flesh of the roots is much more solid and compact, and abounds more with nutritious matter, the *real* quantity of food which they afford must probably be much greater. In the trials of the above cultivator, they are found to go one-third further in the fattening of cattle or other animals, than the common turnip. And the Rev. Mr. Clofe, in the ninth volume of the Bath papers, has recorded an experiment in the transplanted method upon ridges of the same dimensions as those used for the common turnip, and the produce was found, after they had sustained the frosts, in the month of March, without either tops or tails, and when perfectly free from dirt, to be thirty-two tons on the acre. Mr. Daiken has stated in the Nottinghamshire Report, their advantage in the feeding of horses for a few acres to have been as high as thirty pounds the acre. And in the experiments of others, as detailed in the Agricultural Report of the North Riding of Yorkshire, they have likewise been found in common heavier than those of common turnips, though in appearance, from the closeness of their texture, they did not seem to equal them. This is, however, only conjecture, and is quite at variance with what has been the result in other cases, where actual weighing and measuring have been had recourse to. In common soils, and the ordinary modes of cultivation and application of these crops, the quantity of produce on the acre must probably be rated considerably lower, as well as their value as food for live-stock.

On actually weighing a square perch of each of these different sorts of turnip crops in the month of November, in 1808, which were grown together in the same field, on the very same kind of land, at Quarmer Park, near Lancaster, under the excellent management of Charles Gibson, *etq.* the respective weights were found to stand thus:

	Cwt.	qrs.	lbs.
Common turnip	-	-	4 2 10
Ruta бага, or Swedish turnip	-	-	4 2 7
Difference	0	0	3

Which is a very trifling superiority in favour of the former; and on account of the earliness of the season for the growth of the latter, they would in all probability soon exceed it, as they are well known to increase in size and weight to a considerable later period.

It may be stated, that this sort of crop has been found of vast use in the support of sheep and other sorts of live-stock, in the more late winter and early vernal months, where the common turnip is liable to become rotten; or run up to seed: as being much more easily preserved in a sound condition, from its greater power of resisting the effects of the season, even when taken up, as well as while in the ground. In some situations, in very severe seasons, it is however sometimes a little injured, when left in the ground through the winter. Mr. Clofe has however found, that by having the tops and tails removed when they first begin to shoot, and being

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being stacked, they may be kept till the latter end of May, and later probably if necessary; but which can rarely be the case. In this manner a useful supply of cattle food is provided for that difficult and harassing period, when turnips or other similar sorts of food get scarce, exhausted, or unfit for being employed, and when the grass is not in a state to be made use of by the stock. On these accounts it is of course of admirable advantage for the farmer to be well provided with crops of this kind, to the full extent of his livestock, in bringing them through the difficult months of March, April, and the early part of May. Its application has been to almost all sorts of domestic animals: with neat cattle, both in fattening, and as an ordinary article of food, it has long been in use, it is said, with much greater effect than the common turnip. It is given after being cut or chopped into small pieces: when given to milch cows, it is found to increase the milk considerably, and render it more rich, as well as to give it a finer colour; but we are afraid it in some measure affects the flavour, though some have denied its having this effect.

And sheep succeed well upon it, gaining much more while upon it than on the common turnip, but it has been objected to in this application, from its hardness being supposed to injure their teeth, when the root is well grown: this is, we believe, from experience to be only imaginary.

Also, in the North Riding of Yorkshire, in the store-feeding of hogs, it has been found equal to potatoes. And as a food for labouring horses, it is said to be highly beneficial, as rendering a smaller proportion of oats requisite, not being of so loosening a quality as most other roots. In this application, the roots, after being washed and having their tails cut off, are put as below, and cut or chopped into large pieces by some sort of sharp tool acting in a high sort of tub or box for the purpose. In some of the northern districts it is given both in its raw state, or boiled and mixed with barley dust or broken corn. But as the roots are liable to be greatly injured by exposure after being cut, for this use as well as that of fattening cattle, not more than are necessary for the daily consumption should be prepared at a time.

It may be necessary as well as advantageous after this account of the culture and uses of these turnips, to state the facts respecting them, as they are found in those districts where they are become an article of almost general growth. In Hertfordshire, according to the Agricultural Survey of that district, they have so rapidly made their way, as to be found in the usual management of great numbers of the common farmers: no trivial proof, the writer says, of their observation, knowledge, and good sense. He adds that Mr. Byde has this year (1804) 25 acres of them; a very regular plant, promising a great produce. He finds that sheep will not touch the common turnip, if they can get at these; but they are apt to break their teeth, from the greater hardness and solidity of the root. He also finds that they do not taint the milk of cows, like the common turnip; and are an useful food for horses. He sows them from the 13th of May to the 20th of June. When sown very early, as in May, they are so difficult to keep clean, that he prefers June. Mr. Byde reaps better crops of barley after them than after common turnips. And Mr. Greg, at Westmill, has 25 acres: he has cultivated this crop for some years, and generally on a large scale. He manures for them with yard-muck, or pulverized rape-cake, from six to twenty bushels an acre, according to the soil, usually with about twelve, and sows the seed early in May. He states them, from his experience, to be much better than the common turnips; as they never rot, let the weather be as severe as it

may, nor are they stringy, when consumed late in the spring. He informs him that the barley after them is not so good as after other turnips eat earlier, but much better than when those turnips are consumed as late as the Swedish; that they do not cost more in cultivation, yet are of double the value. The farmers sow them very generally, so that few are to be found who sow none. Mr. Wittington, at Broadwater, is a considerable cultivator of this plant. He prefers them to common turnips, and would substitute them for the greatest part of that crop. He sows soon after the first week in May: for the value in feeding, time of consumption, duration, &c. he knows nothing equally valuable. The Rev. Mr. Keate, at Hatfield, is also considerably in this cultivation, and with much success: he has had crops of them for five years. His crop this year amounts to five acres, which he viewed with great pleasure—a fine regular plant, very luxuriant; equally set out, and quite clean. They were well manured with yard-dung, and the land ploughed four times. He sows in the middle of June: they had been hoed at the expence of seven shillings *per* acre: part of the field had yielded a crop of winter tares. They have usually come to a large size on Mr. Keate's farm. He has fed horses with them, entirely to his satisfaction; and cuts the roots with a very simple, effective turnip-slicer: each horse had a bushel every day, with chaff, but no oats; they did their work very well, and became fat while they were eating this turnip. Cows also do well on it; nor does it give their milk or butter any taste, but increases their milk considerably. They are excellent also for fattening sheep. The culture is become very general through this county: so that there are few farmers in it who are without a field of this excellent plant. He likewise says that the marchioness of Salisbury has many acres in great perfection, and finds them of incomparable use. But Mr. Stephenson remarks, that their most important use is so late in the spring, that it is difficult to introduce them in a regular course, and sow spring corn in time: he thinks them rather applicable to a few fields out of a regular rotation for sowing some other crop than barley or oats after them; such, for instance, as winter tares. He may add buck-wheat also. Cows do very well on Swedish turnips without hay, and give much milk; and these roots last longer for sheep in consumption than an equal quantity of common turnips, but the sheep do not thrive equally. Mr. Deerman, of Astwich, is a great friend to them; but observes, that they throw the land out of course: as they are most useful so late in the season, that spring corn cannot be sown after them, he thinks the best way is to sow common turnips for the next crop, by which means also the land would be brought into remarkably high order. Mr. Marsh, his neighbour, makes the same observation, but has, however, always sown spring corn after them.

On this subject it is further stated, that Mr. Clarke, of Sandridgebury, has cultivated them eight or nine years with great success; having generally from 20 to 25 acres annually. He sows the last week in May, and finds no difficulty with the succeeding crop, which is always barley, and as good as any, and often the best on his farm. He has eat them so late as the 6th of May. Mr. Cotton, at Hempstead, cultivates, and has the highest opinion of them; and has only one objection to them, their slow growth, which retards their hoeing. His corn grown after them is good. Mr. Pickford, at Market-street, has 30 acres this year, a beautiful regular crop. He has from experience a great opinion of them, when applied to the fattening of oxen and sheep, and to the feeding of hogs; in which last application he thinks them

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them superior to potatoes. He saw above 500 hogs on his farm. On finding these roots so profitable, he grew no more potatoes. But Mr. Chapman, of Hitchin, is of opinion that this root demands a richer and stronger soil than the chalks and loams about Hitchin; for they have been cultivated some years, dunged for, and twice hoed, but the success has not been great. The farmers entertain a high opinion of them. And Mr. Hale, of King's Walden, has cultivated them four years; he sows them the latter end of May broad-cast; hoes them twice always, picks charlock by hand, and uses all for sheep and lambs: they have been very valuable indeed. In the spring of 1800, he could have sold the crop, eight acres, at 10*l.* *per* acre. In the beginning of March, common turnips being over, 200 sheep and 200 lambs, and 140 other sheep, were kept on them near seven weeks. The same field was to have been sown with barley, and ploughed twice, but being late, was sown with Swedish turnips again, and the crop, without manure, except two cart-loads of pigeons' dung, was in every respect as good as the other. This year the land was ploughed once, and sown with white oats, and the crop was equal to full eight quarters *per* acre. Last year he had fifteen acres, and this year eleven, of this root. Mr. Roberts, the steward, who has a farm himself, has nine acres this year, and intends never to be without them; being perfectly convinced that they are a most useful crop. The writer has not seen many finer crops than Mr. Hale's, and all the parts of a full yellow colour. Lord Clarendon has five or six acres every year, and finds them of capital use. His lordship sows in May, on land, upon which, in autumn, the dung was ploughed in, as he thinks it very essential for this crop; he stirs the land in April, and ploughs it in May for sowing: he sows three pounds *per* acre: they are hand-hoed twice: he first uses them in the beginning of March: he did not eat them last year until the 24th of April, and had a large barley crop after them. They run very much to top, more than common turnips, and if his lordship had none, he would buy them for the spring at a much greater price than common. He feeds first with ewes and lambs, and then flocks sheep follow and eat clean. Good barley always grows after them. He has only gravels to sow them on. Mr. Parker, at Munden, has also cultivated them four years: he has twenty acres this year, and had sixteen last year; and as many the year before. The yellow-fleshed turnip is much the best. He sows in May, hand-hoes twice, and has always very good crops. He feeds them on the land with sheep; and draws them for horses, for which stock they are very useful: he uses them also for beasts of all sorts; they are of prodigious utility in point of duration, and excellent, late in the spring, for straw-fed beasts. He grows as good spring corn after them as after common turnips: but manures for them rather higher than for other sorts. They are best on loamy land; do well on good gravel; but, on very sharp gravel, they should not be sown. His twenty-acred field this year, for such an extent, is the finest crop that the writer ever saw, the earl of Winchelsea's at Burley alone excepted; yet this crop is from the second sowing in June. Mr. Calvert, at Albury, has had them four years; has now seven or eight acres: he sows them at the end of May; and finds that there is not any thing so good for every animal for which he has tried them. He once gave a few to some fattening wethers that were at common turnips, and after eating them, they would not take again to the common turnips without much starving. He has had Swedish turnips and common turnips on each side of them in the same field, and sheep turned into the field would not touch the common turnip, but seized on the Swedish immediately. The yellow-

fleshed is much superior to the white; and the rough-coated to the smooth skins. His present plan is, to assign two fields, well situated for the cattle and sheep, and to have one every year under the Swedish, and the other in common turnips, to follow each other, by which means no inconvenience will result from not getting the Swedish off in time for barley. But Mr. Hill, of Whittle, thinks they injure the land by late keeping and running to feed. However, Mr. Foster, of Roylton, has a high opinion of them; and observes that they are peculiarly valuable in a chalky district, where turnips *must* be fed very early, or the barley crop lost; Swedish then come in when most wanted.

It is noticed that the writer concludes on these statements, that the plant, where the soil is not sufficiently rich, may probably give way; but as to the more common objection of some, that barley cannot follow, not to speak of the success with which so many others sow that grain, it may be observed, that the right system, where the objection has really some foundation, is hinted at in the preceding notes: common turnips, winter tares, or buck-wheat, may properly succeed; and this double fallow can scarcely fail of answering in the uncommon degree of cleanness, which must be the consequence. Another plan is, to draw such as would remain too late, and strew them on grafs for cattle or sheep. The objection is, therefore, in any case easily remedied. And in the Agricultural Survey of Norfolk, it is stated that Mr. Walker, of Harpley, has cultivated them for some years with great success, generally has from twenty to thirty acres annually; feeds them off with sheep and bullocks, and can depend on them when common turnips are all rotten. This crop in 1800, notwithstanding the drought, was very fine. And Mr. Coke, of Holkham, has thirty acres this year, has cultivated them for several years with the greatest success, and esteems them as a very valuable acquisition. Mr. Syble, of South Walsham, had last year a crop of these roots, which came to a good size, but they were so hard that no stock which he tried liked them. But Mr. H. Blythe, of Burnham, had a field of them of great use in the spring; this year he has ten acres.

It may be remarked, upon the whole, that as the objections to this root, on the score of its being difficult to take up, and of its hurtful and inconvenient effects in remaining upon the land to so late a period, seem not well founded, or to be capable of being readily obviated, there can be no doubt but that it must be found of great advantage on most farms where much live-stock is kept, as a food to succeed that of the common turnip late in the spring, when scarcely any other sorts are to be had in plenty for the feeding of live-stock.

In some other districts they are also cultivated to considerable extent, and with much success and advantage, as in those of Oxfordshire, Essex, &c.: their introduction is likewise attempting in many others, where their utility and value are beginning to be known. In the first of the above counties, Mr. Edwards, who cultivates them largely, has a great opinion of them as a resource, when nothing else is to be had, particularly as a spring feed: though they lose their leaves in the winter, what they produce in the spring is very great. As good barley is got after them, in his management, as after common turnips, but they are supposed to draw the ground rather more: it is not known what could be done without them. Mr. James Payne also grows them largely, and has the highest opinion of their utility. They are found by him to be the most profitable of all ways, when applied in the fattening of young pigs called porkers; which should run about as usual during the time of their becoming fat, only having as much of this kind of food as

they can eat. Nine porkers fed in this way paid each sixpence in the day, for six weeks together; which is a remarkable fact, and highly valuable for the cultivators of this root to be acquainted with. Others have had equally great success in the same way of using this root. Mr. Salmon likewise cultivates this root with much success, putting in the crops of it in the latter end of May, or early in the following month: uses his own seed, which produces roots which are single with yellow-coloured flesh, and quite round in form: three hoeings are given in raising them. They are applied as food for calves, sheep, cows, and pigs, being extremely useful in each of such modes: the pigs, however, have only the hulls, after other cattle. They are made use of to the end of April, when spring wheat is sown on the same land after them, and as good crops are procured as after any other sort of crop. They are supposed to produce so much fertility, by the abundant flock which they keep, that barley, if sown after them, would be all straw.

In fact, the farmers of this district are stated to feel a thorough conviction of the importance which is attached to them, and to be well informed of the best modes of applying them in their consumption. Their use in feeding sheep is well understood, and great reliance is placed on them as a late feed in difficult spring seasons. The improved practice of giving them sliced in troughs to penned sheep, is highly worthy of the farmer's attention; and their application in the fattening of oxen, from stores laid up and preserved for that purpose, is of great importance, and highly deserves to be imitated by different other districts. And the discovery which has been made of the young pigs termed porkers being most profitably fattened upon them, is alone of very great consideration: but it requires to be further and more fully ascertained, by a set of experiments instituted expressly for the purpose; as, should the same fact turn out to be well established, not only in this case, but upon soils superior in fertility to the red sand lands in the north of this district, it would be a most valuable discovery indeed to the farming interests of the whole country.

The practical circumstance of sowing winter tares upon a rich and full manuring, eating them off upon the land, and then immediately putting in a crop of this sort, is likewise supposed a method of cultivation which can scarcely be exceeded, on such soils as are of a good quality. The fact of the barley crops after this root being found full as good as those after common turnips, also deserves to be attended to; as the cultivators who maintain it are perfectly aware, that roots, standing in the ground late in the spring, must necessarily tend to draw the land more than if they were consumed at an earlier period; but this circumstance is found to be compensated by the sheep, or other stock, remaining so much longer upon the ground.

In cases where this sort of crop is removed from the field, there is no more objection on that account than in the case of common turnips; but it may be done with the very superior advantage, that this root can be kept in any method with perfect safety, which is well known cannot be done with common turnips.

And in the latter of the above counties, the farmers find them equally valuable and useful in feeding and fattening different sorts of live-stock. By some they are thought to be uncommonly useful, and to feed stock in a manner which shews their quality to be very rich in nourishment. But when kept late, spring tares, it is thought, should be sown after them, as barley is hazardous; and others find them much better for fattening sheep and bullocks than common turnips. They are the grand staple article for the latter purpose, in some instances; one bushel of them being found

worth three of common turnips, in such an application. The beasts and hogs, which have once tasted them, refuse other turnips afterwards. Eight or nine quarters of barley are taken from the acre, in some cases, after this root; but the manuring for it was large. The leaves of the crops have sometimes been fed off in the autumn, which did not in the least hurt them; and though the sheep ate into some of the roots, the frost had no other effect than to cover the wound with a thin skin of putrefaction, leaving the rest of the root perfectly sound. Half the crop has been drawn for horses, which are found to be very fond of them; and they were ascertained to be nearly as useful as carrots in this application. They are also excellent for feeding and rearing young calves. The best crops here seem to be raised by full manuring, especially with long, fresh, unflurred dung from the farm-yard.

This root is likewise beginning to be esteemed, and a favourite with some farmers, in the county of Berks, where it is found to have several advantages over the common turnip, especially those of resisting the severest frosts, and of being as good and fit for use in the beginning of the new year, as the other kind is at the end of the old one, and thus forming a link in the succession of feed for live-stock, and saving the expence of hay and other articles. From its sweetness, superior firmness, and more nutritious juicy quality, it is found more quick in its fattening properties; but from its more slow growth, it is supposed to exhaust the land to a greater degree: yet, where there are rich, deep, loamy soils, it is undoubtedly entitled to a preference, on these and many other accounts.

In Devonshire, in the practice of Mr. Exter, the relative produce between the transplanted root of this kind and the Norfolk green turnip, under precisely the same circumstances as to the nature and condition of the land, is stated by Mr. Vancouver as 628 to 851; giving a most decided preference to the former, after amply defraying the additional expence of transplanting.

RUTA MURARIA, in *Botany*, Wall Rue, a common little European Fern, so called from its general place of growth, and the resemblance of its deep glaucous green fronds, to the leaves of Rue. See RUTA, and ASPLENium, species 21.

RUTACEÆ, so named from the genus *Ruta*, which is one of the tribe, is a natural order of plants, the 81st in the system of Jussieu, or the 21st of his 13th class. The characters of this important class are given under GERANIA. Of the order now before us, Jussieu must be considered as the founder. We shall, therefore, exhibit his own view of it, though that view is very incomplete, and capable of being much improved and elucidated by recent discoveries.

Calyx of one leaf, often in five deep segments. *Petals* mostly five, alternate with the segments of the calyx. *Stamens* definite, distinct, generally ten, alternately opposite to the petals and to the calyx. *Germen* simple; style solitary; stigma simple, or rarely divided. *Fruit* either of many cells, or many capsules, the cells or capsules mostly five, each containing one or more seeds, inserted into the inner angle. *Corculum* flat, in a fleshy albumen. *Stem* either herbaceous or shrubby, rarely arboreous. *Leaves* in some alternate, naked; in others accompanied by stipulas, in which case they are most usually opposite. *Flowers* either axillary or terminal.

Seçt. 1. *Leaves with stipulas, and mostly opposite.*

This section consists of *Tribulus*, *Fagonia*, *Zygophyllum*, and *Guaiaacum*, all Linnæan genera.

Seçt. 2. *Leaves alternate, without stipulas.*

Ruta, *Peganum*, and *Diſſamnus*.

SECT. 3. Genera akin to the *Rutaceæ*.

Melanthus, *Dioſma*, *Empleurum* of Solander, and *Aruba* of Aublet.

The author obſerves that the plants of the firſt ſection are moſt akin to his *Gerania*, but differ from that order in having a fleſhy *albumen* and a ſtraight *coreulum*. Their habit is more like *Caffia*, and its allies, among the leguminous family, which have likewiſe abruptly pinnated leaves, attended by ſtipulas, as well as ten ſtamens with one ſtyle; but theſe *Rutaceæ* differ in having oppoſite leaves, a fruit of many cells, and eſpecially ſtamens inſerted into the receptacle, beneath the germen. He inquires whether *Quaſſia*, *Thryallis*, *Trigonis*, &c. be akin to them? Alſo whether his two ſections are with propriety combined together, and whether they ought not rather to conſtitute different orders, diſtinguiſhed by the fruit? However this may be, he adds, the *Rutaceæ* are diſtinguiſhed, by the definite number of their ſtamens, from both *Tiliaceæ* and *Ciſti*, while the alternate ſituation of thoſe organs with reſpect to the corolla, diſtinguiſhes this order from the *Berberides*.

The true idea of the order before us muſt be taken from Juſſieu's ſecond ſection, compoſed of *Ruta*, *Peganum*, and *Diſſamnus*, to which are, moſt indubitably, to be added from his third, *Dioſma* and *Empleurum*; but ſcarcely the *Aruba* of Aublet, and certainly not *Melanthus*. The diſcoveries in the ſouthern hemisphere have made botaniſts acquainted with many new genera of this tribe. (See *PIEBALIU*M, *CORRÆA*, *CROWEA*, *ERIOSTEMON*, and *MELICOPE*.) *Tetratheca*, however, is erroneouſly mentioned, under the laſt article, as belonging to the ſame family. We have always been inclined to refer *OXALIS* to it, (ſee that article,) rather than to the *Gerania*, on account of the elaſtic *arillus* of its ſeeds, ſo analogous to what occurs in many *Rutaceæ*; at leaſt *Oxalis* is a connecting link between the two orders.

The *Rutaceæ* are nearly all ſhrubby; their *leaves* without *ſtipulas*, coriaceous, or ſlightly fleſhy, moſtly ſmooth, full of reſinous dots ſtrongly ſcented, ſometimes acid; uſually alternate and ſimple; in ſome inſtances oppoſite, whorled, or compound. *Flower-ſtalks* moſtly axillary, either ſimple, aggregate, or forked. *Calyx* in four or five deep ſegments. *Petals* four or five. *Stamens* almoſt always twice as many as the petals; their filaments often peculiar in ſtructure, with ſome ſort of appendages; the anthers not always terminal, ſometimes ſupported on a partial ſtalk. *Style* ſimple, connected with the inner angle of each cell of the germen, either at the ſummit or baſe. *Capsule* of four or five cells, each lined with a membranous or horny, more or leſs elaſtic, tunic, ſerving to ſcatter the *ſeeds*. Moſt of the flowers are regular, *Diſſamnus* being perhaps the only exception. It is an obſervation of our learned friend Mr. Correa, that every natural order ſeems to afford one genus, at leaſt, with an irregular flower.

Our *ZERIA*, Tr. of Linn. Soc. v. 4. 216, belongs to this order, and we truſt will appear, in its proper place, hereafter. So likewiſe does *BORONIA*, which, having been accidentally omitted by the Rev. Mr. Wood, in vol. v. we ſhall here deſcribe.

BORONIA was ſo named, by the writer of the preſent article, in memory of his faithful ſervant and friend Francis Borone, born at Milan, April 6, 1769, who devoted himſelf to botany with an ardour, which his ſingular turn for obſervation, and acutenefs of diſcrimination, even with regard to the technical characters of plants, promiſed to render eminently advantageous to the ſcience. This ardour induced him to viſit Sierra Leone, as aſſiſtant to Dr. Adam

Afzelius, with whom he returned, rich in diſcoveries and information, in the autumn of 1793. The next year he attended the late profeſſor Sibthorp to Greece, and unfortunately died, by an accidental fall, at Athens, in October, 1794.—Sm. Traſts, 287. Poirer in Lamarek Dict. v. 8. 503. Ait. Hort. Kew. v. 2. 348.—Clas and order, *Oc-tandria Monogynia*. Nat. Ord. *Rutaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, in four deep, equal ſegments, permanent. *Cor.* Petals four, equal, alternate with the calyx and much longer, ſeſſile, withering. Nectary a glandular ring, ſurrounding the baſe of the germen. *Stam.* Filaments eight, ſhorter than the corolla, inſerted into the receptacle, alternately oppoſite to the petals and calyx, flat, tapering, fringed, terminating variously, four of them a little the ſhorteſt; anthers of two cells, roundiſh, incumbent, inſerted on the inſide below the ſummit of each filament. *Piſt.* Germen ſuperior, ſtanding on the nectary, conical, with four furrows; ſtyle vertical, ſhort; ſtigma roundiſh, ſmooth, with four notches. *Peric.* Capsule of four diſtinct lobes, ſoon ſeparating, compressed, each of one cell, and two equal valves, lined with a bivalve elaſtic tunic. *Seeds* one or two, oblong, compressed, ſmooth, poliſhed.

Eff. Ch. *Calyx* in four deep ſegments. *Petals* four. Anthers ſtalked, below the ſummit of the filaments. *Style* terminal, very ſhort. *Stigma* capitate. *Capsule* of four compressed lobes. *Seeds* with an elaſtic tunic.

SECT. 1. *Leaves compound.*

1. *B. pinnata*. Hawthorn-ſcented *Boronia*. Sm. Tr. 290. t. 4. Ait. n. 1. Andr. Repof. t. 58. Venten. Malmaif. t. 38. Poirer n. 4.—*Leaves* pinnate, entire, ſmooth. *Flower-ſtalks* axillary, forked. *Filaments* obtuſe and glandular at the ſummit.—Found in the neighbourhood of Port Jackson, New South Wales. Firſt raiſed in England by Meſſrs. Lee and Kennedy in 1794. It proves a favourite, but not common, green-houſe ſhrub, flowering throughout the ſpring, and much admired for the beauty as well as ſcent of its flowers, which laſt reſembles hawthorn, approaching to *Heliotropium peruvianum*. The plant is ſmooth, ſhrubby, two or three feet high, with many roundiſh, reddiſh, leafy branches. *Leaves* oppoſite, rarely three together, without *ſtipulas*, of from three to five pair of ſeſſile, lanceolate, pointed, entire *leaflets*; the terminal one rather ſmaller than the reſt; the common ſtalk jointed, channelled, ſlightly winged, ſmooth. *Panicles* axillary, forked, ſmooth, with ſquare ſtalks, ſwelling upward. *Braſteas* ſmall, thick, oppoſite, acute. *Calyx* reddiſh. *Corolla* of a delicate pink. *Filaments* fringed with white woolly hairs to the very top, which terminates in a blunt glandular body, ſometimes ſlightly hairy alſo, riſing above the *anther*, whole ſtalk is curved downwards, over the *ſtigma*. *Germen* ſmall, with a hairy *ſtyle*. *Seeds* ſolitary, black, in a white, poliſhed, rigid, elaſtic tunic. The dried *petals* retain ſomewhat of an acid taſte.

2. *B. alata*. Wing-ſtalked *Boronia*. Sm. Tranſ. of Linn. Soc. v. 8. 283.—*Leaves* pinnate, crenate; their common ſtalk hairy. *Flower-ſtalks* forked. *Filaments* obtuſe. *Anthers* nearly terminal.—Gathered by Mr. Menzies, at King George's ſound, on the weſt coaſt of New Holland. Rather larger, and more handſome, than even the preceding. The *branches* are hairy, as well as the under ſide of the common *ſtootalks*, eſpecially at their joints. Theſe ſtalks have alſo a more dilated wing, reſembling *Fagara* in that reſpect. *Leaflets*, moſtly five pair, broad, elliptical, revolute, and crenate, with a hairy rib beneath. *Panicles* axillary, but all crowded about the tops of the branches, hairy, with fringed *braſteas*. *Flowers* larger than in *B. pinnata*; their dried petals with an opaque whitenefs

on the upper side, reddish-brown beneath. *Filaments* fringed all the way up, each terminating in a round knob, nearly on the top of which stands the capillary stalk bearing the *anther*.

3. *B. pilosa*. Hairy Boronia. Labill. Nov. Holl. v. 1. 97. t. 124. Poiret n. 1.—Leaves pinnate; leaflets linear-lanceolate, hairy, entire. Flowers solitary, axillary, and terminal, on stalks longer than the leaves.—Native of the cape of Van Diemen. *Labillardiere*. A smaller shrub than the two preceding, being only from nine to eighteen inches high. *Leaflets* from five to eleven, small and narrow, each about half an inch long; their stalks jointed, not winged. *Flowers* erect, about half the size of *B. pinnata*, solitary, on simple stalks, bearing two pair of awl-shaped *bractæas*. *Filaments* fringed, each with a round hairy head, beneath which the capillary footstalk of the *anther* is inserted.

4. *B. tetrandra*. Tetrاندrous Boronia. Labill. Nov. Holl. v. 1. 98. t. 125. Poiret n. 2.—Leaves pinnate; leaflets obtuse, smooth. Flowers solitary, axillary, on short recurved stalks. Four of the stamens awl-shaped, without anthers.—Gathered by the same botanist in Lewin's land, on the fourth coast of New Holland. This shrub is a cubit high and hairy, except the *leaflets*, which are of a very narrow obovate figure, obtuse and entire, about the size and number of the last. *Flowers* drooping, on short axillary stalks. Four of the *filaments*, opposite to the petals, are somewhat club-shaped, and bear the *anthers* on stalks below the summit; the rest, opposite to the *calyx*, are awl-shaped, rather longer, destitute of *anthers* or their stalks.

SECT. 2. *Leaves simple*.

5. *B. ferrulata*. Rose-scented Boronia. Sm. Tr. 292. t. 5.—Leaves rhomboid, acute; unequally ferrated in the upper part. Flower-stalks aggregate, terminal. *Filaments* heart-shaped and hispid at the summit.—Gathered near Port Jackson, New South Wales, by John White, M.D., to whom we are obliged for specimens and coloured drawings. A very elegant, smooth, much branched shrub, four feet high, not yet introduced into our green-houses, though few can be more worthy of cultivation. The *leaves* are opposite, numerous, rather crowded, hardly an inch long, somewhat oblique, entire, and tapering towards the base, sharply ferrated or toothed above; smooth on both sides, minutely dotted, with scarcely any traces of ribs or veins; their colour often purplish; their flavour approaching to that of turpentine. *Flowers* of a beautiful red, many exceeding that of the first species, and their scent said to resemble the fragrance of a rose. The *filaments* are red, fringed with pale hairs chiefly at the base, each terminating in a globular, emarginate knob, covered with white prominent hairs, and largest in the four longer stamens. The *anthers* stand, each on a deflexed stalk, below this knob. *Style* very short. *Seeds* two in each elastic tunic.

6. *B. crenulata*. Small-leaved notched Boronia. Sm. Transf. of Linn. Soc. v. 8. 284.—Leaves obovate, with a small point, finely crenate. Stalks single-flowered, axillary, and terminal. *Filaments* obtuse and glandular at the summit.—Gathered at King George's sound, by Mr. Menzies, with the second species. This appears at first like a slender delicate variety of the *ferrulata*, the *leaves* being about one-third the size of that species; but they are obovate, minutely crenate, not sharply toothed. The *flowers* essentially differ, being much smaller, axillary, as well as terminal, and all solitary, on bracteated angular stalks, shorter than the leaves. *Calyx* fringed. *Filaments* densely fringed throughout, obtuse, but not inversely heart-shaped, at the top, neither are they bristly, though glandular,

there; below the summit they are tumid and inflexed; and the footstalks of the *anthers* are nearly terminal.

7. *B. denticulata*. Narrow-leaved toothed Boronia. Sm. Transf. of Linn. Soc. v. 8. 284.—Leaves linear, toothed. Flower-stalks corymbose. *Filaments* obtuse and glandular at the summit.—Found by Mr. Menzies with the last. A branched, smooth, erect shrub, with longer, and much narrower, *leaves* than in any other known species of this genus, their margins regularly, and rather strongly, but obtusely, toothed; their base tapering down into a sort of footstalk. *Flowers* in axillary or terminal smooth corymbs, with small deciduous *bractæas*. *Calyx* smooth. *Petals* of a pale rose-colour, with a dark red rib, their size not much above half that of the *B. pinnata*. *Filaments* but slightly fringed, their summits obtuse and glandular, but not hairy. *Anthers* on lateral horizontal stalks.

8. *B. parviflora*. Pale-flowered Boronia. Sm. Tr. 295. t. 6.—Leaves obovato-lanceolate, obscurely crenate. Stalks aggregate, terminal, single-flowered. *Filaments* oblong and glandular at the summit.—Gathered near Port Jackson, by Dr. White, who sent us specimens and drawings in 1795. A smooth erect shrub, a foot or more in height, most branched and leafy at the top. *Leaves* obovate, or elliptic-lanceolate, opposite, as in all the preceding species of the present section, hardly an inch long, slightly crenate, chiefly towards the end, smooth dotted, veinless, a little aromatic. *Flower-stalks* smooth, simple, club-shaped, three together at the summit of each branch, with two axillary ones occasionally from the adjoining pair of leaves. Sometimes one or two leafy branches are extended beyond the inflorescence. *Bractæas* two or four, ovate, concave, smooth, at the common base of the stalks. *Flowers* small. *Calyx* purplish, half as long as the *petals*, which are ovate, pointed, pale bluish-coloured, with a red mid-rib. *Filaments* pink, fringed with white hairs, and terminating in an oblong, obtuse, small, slightly glandular, but not hairy, appendage, below which the *anther* projects laterally, on a horizontal stalk.

9. *B. pilonema*. Single-flowered Boronia. Labill. Nov. Holl. v. 1. 98. t. 126. Poiret n. 3.—Leaves elliptic-oblong, entire. Stalks terminal, solitary, single-flowered, without bractæas. *Filaments* smooth, their summit very short.—Found by Labillardiere, at cape Van Diemen. The *root* is knotty at the summit, producing several upright, simple, round, rather shrubby, *stems*, about half a foot high. *Leaves* opposite or three together, dotted, not an inch long, entire, acute, without rib or veins. *Flower-stalks* erect, swelling upwards, longer than the leaves, naked. *Flowers* about the size of the last. *Calyx* smooth, nearly as long as the *petals*. *Filaments* awl-shaped, smooth, simple, their minute points hardly extended beyond the insertion of the little stalk of the *anther*, which however is marginal, or lateral. The author suspected this plant to be very nearly related to the last, from which nevertheless he rightly distinguishes it by the solitary *flowers*, unaccompanied by *bractæas*, and the smooth *stamens*, whose points scarcely project above the spot where the *anther* is inserted, so that the latter stands above the *filament*, like a little hat, or cap; a circumstance perhaps alluded to in the name. The habit of this species, particularly the *root*, seems most to resemble the following.

10. *B. polygalifolia*. Milkwort-leaved Boronia. Sm. Tr. 297. t. 7.—Leaves linear-lanceolate, entire. Stalks axillary, solitary, single-flowered, much shorter than the leaves. *Filaments* hairy, their summit short and blunt.—Native of the neighbourhood of Port Jackson. The *root* is woody and knotty like the last, throwing up many *stems*, which

which are simple and leafy, as in that species, and the same height, but appear to be herbaceous rather than shrubby. *Leaves* mostly opposite, very rarely alternate, sometimes three together, almost sessile, an inch or more in length, acute at each end, entire, dotted, with one central rib; their under side palest. *Flower-stalks* erect, club-shaped, not a quarter the length of the leaves, angular, with a pair of small *bractæas* about the middle. *Calyx* small, green, smooth. *Petals* five times as long as the calyx, rose-coloured, tipped with deeper crimson. *Filaments* pale, fringed to the top, obtuse, though scarcely extended beyond the point where the stalk of the drooping *anther* is laterally inserted. *Style* about as long as the *germen*, firmly attached to its top, so as to split into four parts with the separating cells of the fruit. *Seeds* solitary. The various distribution of the *leaves* in this species is peculiar to it. The *stems* are very rarely branched.

RUTE, in *Geography*, a town of Spain, in the province of Cordova; 5 miles S. of Lucena.

RUTENI PROVINCIALES, in *Ancient Geography*, a people of Gallia Narbonensis, according to Pliny. Cæsar (Bell. Gall. l. vii. c. 7.) mentions them. These people inhabited the territory to the left of the Tarn.

RUTGERS, JOHN, in *Biography*, an able critic and negociator, was born of an ancient family at Dordrecht, in 1589. He received a part of his early education under Gerard Vossius, and in 1605 was sent to Leyden, where he resided with Dominic Baudius. Having completed his course, he travelled into France, and took the degree of licentiate in law at Orleans. While at Paris, he printed, at the office of Robert Stephens, an edition of Horace, with notes; which was afterwards reprinted by Burmann, at Leyden, in 1699. When he returned to Holland, he accepted the invitation of the Swedish ambassador to accompany him to Sweden, where Gustavus Adolphus, in 1614, conferred upon him the title of his counsellor. He was, after this, employed three times as envoy from that prince to Holland upon very important affairs, in which he acquitted himself with great credit, and quite to the satisfaction of his majesty, who ennobled him in 1619. He visited Bohemia, Denmark, and several German courts, in the same quality; and lastly he resided at the Hague, as minister from Gustavus to that republic, where he died in 1625, at the age of 36. He had published in 1618 six books, entitled "Varie Lectiones;" and after his death, Hinsius published his Latin poems in conjunction with his own.

RUTH, in *Biblical History*, a sacred book of scripture, admitted into the canon, and placed in our bibles between the book of Judges and those of Samuel, as being the sequel of the former and an introduction to the latter. St. Jerome informs us, that the Jews added it to the book of Judges, because the transactions which it records happened in the time of the judges of Israel (Judges, ii. 1.); and several of the ancient fathers make but one book of the Judges and Ruth. But the modern Jews place in their bibles, after the Pentateuch, the five megilloth, viz. the Song of Songs, Ruth, the Lamentations of Jeremiah, Ecclesiastes, and Esther. Ruth is sometimes placed the first of the five, sometimes the second, and sometimes the fifth.

The scope of the author of this book is to relate the genealogy of David; and hence it has been conjectured, that the first book of Samuel was composed by the same author; in which book he could not conveniently place the genealogy of David, and he therefore chose to give it by itself. The writer observes, at the beginning of his work, that the history he proposed to relate happened when the

judges governed Israel; and, therefore, they ceased to govern it when he wrote. He also speaks of David at the end of his book; which shews, that the earliest period that can be assigned to it must be the time of David. Besides, there are two modes of expression in it, which occur only in the books of Samuel and of the Kings. The first is, "The Lord do so to me, and more also," Ruth, i. 17. Compare 1 Sam. iii. 17. xiv. 44. xx. 23. 2 Sam. iii. 9. 35. xiv. 13. 1 Kings, ii. 23. xix. 2. xx. 10. 2 Kings, vi. 31. The second phrase is, "I have discovered to your ear," for "I have told you," Ruth, iv. 4. Compare 1 Sam. xx. 2. 2 Sam. vii. 27. The canonicalness of this book was never disputed. Ruth the Moabitess occurs in the genealogy of our Saviour, Matt. i. 5.

Ruth had married the son of Elimelech and Naomi, who had settled for some time in Moab; but being desirous of returning to Bethlechem, her own country, after having lost her husband and two sons, was accompanied by her daughter-in-law Ruth. This event happened, according to Usher, about 120 years after the time of Joshua. When Naomi came to Bethlechem, Ruth went to the fields in order to glean for their support; and by chance entering the field of a rich citizen of Bethlechem, named Boaz, who was related to Elimelech, her father-in-law, received from him civilities, which indicated his affection for her. In process of time, Ruth became the wife of Boaz, by whom she had a son called Obed, who was father to Jesse, and grandfather to king David. Such is an outline of the history contained in the book of Ruth.

RUTHE, in *Commerce*, a long measure at Amsterdam, which is equal to 13 feet, or 143 inches, the Amsterdam foot being = 11½ inches; the Rhineland foot of 12 inches being = 12½ English inches. At Berlin the ruthe is = 12 Rhineland feet = 148½ English inches. At Hamburgh the ruthe or perch is of two sorts: one is 7 ells, or 14 feet; the other 8 ells, or 16 feet, Hamburgh measure. The Rhineland ruthe (12 Rhineland feet) is 13½ Hamburgh feet, or 12½ English feet. A Hamburgh mile contains 2000 Rhineland rutes, or 8244 English yards: hence 14½ such miles answer nearly 10 a degree of the meridian, and 16 Hamburgh miles to 75 English miles. A scheffel of corn-land contains 200 square rutes, each 256 Hamburgh square feet, which gives 166 English square perches, or 1 acre 6 perches. A morgen or acre of land contains 600 square rutes, each ruthe being 196 Hamburgh square feet, which equal 2 acres 6½ perches, English measure. See MEASURE. Kelly's Un. Camb.

RUTHERFORD, in *Geography*, a county of Morgan district, in North Carolina, bounded N. by Burke, and S. by the state of South Carolina. It contains 13,202 inhabitants.

RUTHERFORD, the capital of the above county, which has a court-house, gaol, and a few houses.

RUTHERFORTH, THOMAS, in *Biography*, was born at Papsworth-Everhard, in Cambridgeshire, in 1712. Having passed through the elementary parts of his education, he was entered at St. John's college, in the university of Cambridge, where he took his degrees in the arts, and obtained a fellowship in the college. He was afterwards appointed regius professor of divinity in the university, and created D.D. Being attached to, and well versed in, mathematics and natural philosophy, he was elected a fellow of the Royal Society, and was afterwards appointed a chaplain to his royal highness the prince of Wales. In the church he was rector of Barley in Hertfordshire, and of Shenfield in Essex, and an archdeacon. He died in October, 1771, having nearly completed his 59th year. He was author of

a thin

on the upper side, reddish-brown beneath. *Filaments* fringed all the way up, each terminating in a round knob, nearly on the top of which stands the capillary stalk bearing the *anther*.

3. *B. pileosa*. Hairy Boronia. Labill. Nov. Holl. v. 1. 97. t. 124. Poiret n. 1.—Leaves pinnate; leaflets linear-lanceolate, hairy, entire. Flowers solitary, axillary, and terminal, on stalks longer than the leaves.—Native of the cape of Van Diemen. *Labillardiere*. A smaller shrub than the two preceding, being only from nine to eighteen inches high. *Leaflets* from five to eleven, small and narrow, each about half an inch long; their stalks jointed, not winged. *Flowers* erect, about half the size of *B. pinnata*, solitary, on simple stalks, bearing two pair of awl-shaped *bractees*. *Filaments* fringed, each with a round hairy head, beneath which the capillary footstalk of the *anther* is inserted.

4. *B. tetrandra*. Tetrandrous Boronia. Labill. Nov. Holl. v. 1. 98. t. 125. Poiret n. 2.—Leaves pinnate; leaflets obtuse, smooth. Flowers solitary, axillary, on short recurved stalks. Four of the stamens awl-shaped, without anthers.—Gathered by the same botanist in Lewin's land, on the south coast of New Holland. This shrub is a cubit high and hairy, except the *leaflets*, which are of a very narrow obovate figure, obtuse and entire, about the size and number of the last. *Flowers* drooping, on short axillary stalks. Four of the *filaments*, opposite to the petals, are somewhat club-shaped, and bear the *anthers* on stalks below the summit; the rest, opposite to the *calyx*, are awl-shaped, rather longer, destitute of *anthers* or their stalks.

SECT. 2. *Leaves simple*.

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there; below the summit they are tumid and inflexed; and the footstalks of the *anthers* are nearly terminal.

7. *B. denticulata*. Narrow-leaved toothed Boronia. Sm. Transf. of Linn. Soc. v. 8. 284.—Leaves linear, toothed. Flower-stalks corymbose. Filaments obtuse and glandular at the summit.—Found by Mr. Menzies with the last. A branched, smooth, erect shrub, with longer, and much narrower, *leaves* than in any other known species of this genus, their margins regularly, and rather strongly, but obtusely, toothed; their base tapering down into a sort of footstalk. *Flowers* in axillary or terminal smooth corymbs, with small deciduous *bractees*. *Calyx* smooth. *Petals* of a pale rose-colour, with a dark red rib, their size not much above half that of the *B. pinnata*. *Filaments* but slightly fringed, their summits obtuse and glandular, but not hairy. *Anthers* on lateral horizontal stalks.

8. *B. parviflora*. Pale-flowered Boronia. Sm. Tr. 295. t. 6.—Leaves obovato-lanceolate, obscurely crenate. Stalks aggregate, terminal, single-flowered. Filaments oblong and glandular at the summit.—Gathered near Port Jackson, by Dr. White, who sent us specimens and drawings in 1795. A smooth erect shrub, a foot or more in height, most branched and leafy at the top. *Leaves* obovate, or elliptic-lanceolate, opposite, as in all the preceding species of the present section, hardly an inch long, slightly crenate, chiefly towards the end, smooth dotted, veinless, a little aromatic. *Flower-stalks* smooth, simple, club-shaped, three together at the summit of each branch, with two axillary ones occasionally from the adjoining pair of leaves. Sometimes one or two leafy branches are extended beyond the inflorescence. *Bractees* two or four, ovate, concave, smooth, at the common base of the stalks. *Flowers* small. *Calyx* purplish, half as long as the *petals*, which are ovate, pointed, pale bluish-coloured, with a red mid-rib. *Filaments* pink, fringed with white hairs, and terminating in an oblong, obtuse, small, slightly glandular, but not hairy, appendage, below which the *anther* projects laterally, on a horizontal stalk.

9. *B. pilonema*. Single-flowered Boronia. Labill. Nov. Holl. v. 1. 98. t. 126. Poiret n. 3.—Leaves elliptic-oblong, entire. Stalks terminal, solitary, single-flowered, without bractees. Filaments smooth, their summit very short.—Found by Labillardiere, at cape Van Diemen. The *root* is knotty at the summit, producing several upright, simple, round, rather shrubby, *stems*, about half a foot high. *Leaves* opposite or three together, dotted, not an inch long, entire, acute, without rib or veins. *Flower-stalks* erect, swelling upwards, longer than the leaves, naked. *Flowers* about the size of the last. *Calyx* smooth, nearly as long as the *petals*. *Filaments* awl-shaped, smooth, simple, their minute points hardly extended beyond the insertion of the little stalk of the *anther*, which however is marginal, or lateral. The author suspected this plant to be very nearly related to the last, from which nevertheless he rightly distinguishes it by the solitary *flowers*, unaccompanied by *bractees*, and the smooth *stamens*, whose points scarcely project above the spot where the *anther* is inserted, so that the latter stands above the *filament*, like a little hat, or cap; a circumstance perhaps alluded to in the name. The habit of this species, particularly the *root*, seems most to resemble the following.

10. *B. polygalifolia*. Milkwort-leaved Boronia. Sm. Tr. 297. t. 7.—Leaves linear-lanceolate, entire. Stalks axillary, solitary, single-flowered, much shorter than the leaves. Filaments hairy, their summit short and blunt.—Native of the neighbourhood of Port Jackson. The *root* is woody and knotty like the last, throwing up many *stems*, which

which are simple and leafy, as in that species, and the same height, but appear to be herbaceous rather than shrubby. *Leaves* mostly opposite, very rarely alternate, sometimes three together, almost sessile, an inch or more in length, acute at each end, entire, dotted, with one central rib; their under side palest. *Flower-stalks* erect, club-shaped, not a quarter the length of the leaves, angular, with a pair of small *bractæas* about the middle. *Calyx* small, green, smooth. *Petals* five times as long as the calyx, rose-coloured, tipped with deeper crimson. *Filaments* pale, fringed to the top, obtuse, though scarcely extended beyond the point where the stalk of the drooping *anther* is laterally inserted. *Style* about as long as the *germen*, firmly attached to its top, so as to split into four parts with the separating cells of the fruit. *Seeds* solitary. The various distribution of the *leaves* in this species is peculiar to it. The *stems* are very rarely branched.

RUTE, in *Geography*, a town of Spain, in the province of Cordova; 5 miles S. of Lucena.

RUTENI PROVINCIALES, in *Ancient Geography*, a people of Gallia Narbonensis, according to Pliny. Cæsar (Bell. Gall. l. vii. c. 7.) mentions them. These people inhabited the territory to the left of the Tarn.

RUTGERS, JOUS, in *Biography*, an able critic and negociator, was born of an ancient family at Dordrecht, in 1589. He received a part of his early education under Gerard Vossius, and in 1605 was sent to Leyden, where he resided with Dominic Baudius. Having completed his course, he travelled into France, and took the degree of licentiate in law at Orleans. While at Paris, he printed, at the office of Robert Stephens, an edition of Horace, with notes; which was afterwards reprinted by Burmann, at Leyden, in 1699. When he returned to Holland, he accepted the invitation of the Swedish ambassador to accompany him to Sweden, where Gustavus Adolphus, in 1614, conferred upon him the title of his counsellor. He was, after this, employed three times as envoy from that prince to Holland upon very important affairs, in which he acquitted himself with great credit, and quite to the satisfaction of his majesty, who ennobled him in 1619. He visited Bohemia, Denmark, and several German courts, in the same quality; and lastly he resided at the Hague, as minister from Gustavus to that republic, where he died in 1625, at the age of 36. He had published in 1618 six books, entitled "Varie Lectiones;" and after his death, Hainsius published his Latin poems in conjunction with his own.

RUTH, in *Biblical History*, a sacred book of scripture, admitted into the canon, and placed in our bibles between the book of Judges and those of Samuel, as being the sequel of the former and an introduction to the latter. St. Jerome informs us, that the Jews added it to the book of Judges, because the transactions which it records happened in the time of the judges of Israel (Judges, ii. 1.); and several of the ancient fathers make but one book of the Judges and Ruth. But the modern Jews place in their bibles, after the Pentateuch, the five megilloth, viz. the Song of Songs, Ruth, the Lamentations of Jeremiah, Ecclesiastes, and Esther. Ruth is sometimes placed the first of the five, sometimes the second, and sometimes the fifth.

The scope of the author of this book is to relate the genealogy of David; and hence it has been conjectured, that the first book of Samuel was composed by the same author; in which book he could not conveniently place the genealogy of David, and he therefore chose to give it by itself. The writer observes, at the beginning of his work, that the history he proposed to relate happened when the

judges governed Israel; and, therefore, they ceased to govern it when he wrote. He also speaks of David at the end of his book; which shews, that the earliest period that can be assigned to it must be the time of David. Besides, there are two modes of expression in it, which occur only in the books of Samuel and of the Kings. The first is, "The Lord do so to me, and more also," Ruth, i. 17. Compare 1 Sam. iii. 17. xiv. 44. xx. 23. 2 Sam. iii. 9. 35. xiv. 13. 1 Kings, ii. 23. xix. 2. xx. 10. 2 Kings, vi. 31. The second phrase is, "I have discovered to your ear," for "I have told you," Ruth, iv. 4. Compare 1 Sam. xx. 2. 2 Sam. vii. 27. The canonicalness of this book was never disputed. Ruth the Moabitess occurs in the genealogy of our Saviour, Matt. i. 5.

Ruth had married the son of Elimelech and Naomi, who had settled for some time in Moab; but being desirous of returning to Bethlehem, her own country, after having lost her husband and two sons, was accompanied by her daughter-in-law Ruth. This event happened, according to Usher, about 120 years after the time of Joshua. When Naomi came to Bethlehem, Ruth went to the fields in order to glean for their support; and by chance entering the field of a rich citizen of Bethlehem, named Boaz, who was related to Elimelech, her father-in-law, received from him civilities, which indicated his affection for her. In process of time, Ruth became the wife of Boaz, by whom she had a son called Obed, who was father to Jesse, and grandfather to king David. Such is an outline of the history contained in the book of Ruth.

RUTHE, in *Commerce*, a long measure at Amsterdam, which is equal to 13 feet, or 143 inches, the Amsterdam foot being = 11½ inches; the Rhineland foot of 12 inches being = 12½ English inches. At Berlin the ruthe is = 12 Rhineland feet = 148½ English inches. At Hamburg the ruthe or perch is of two sorts: one is 7 ells, or 14 feet; the other 8 ells, or 16 feet, Hamburg measure. The Rhineland ruthe (12 Rhineland feet) is 13½ Hamburg feet, or 12¼ English feet. A Hamburg mile contains 2000 Rhineland rutes, or 8244 English yards: hence 14½ such miles answer nearly to a degree of the meridian, and 16 Hamburg miles to 75 English miles. A scheffel of corn-land contains 200 square rutes, each 256 Hamburg square feet, which gives 166 English square perches, or 1 acre 6 perches. A morgen or acre of land contains 600 square rutes, each ruthe being 196 Hamburg square feet, which equal 2 acres 6½ perches, English measure. See MEASURE. Kelly's Un. Camb.

RUTHERFORD, in *Geography*, a county of Morgan district, in North Carolina, bounded N. by Burke, and S. by the state of South Carolina. It contains 13,202 inhabitants.

RUTHERFORD, the capital of the above county, which has a court-house, gaol, and a few houses.

RUTHERFORTH, THOMAS, in *Biography*, was born at Papsworth-Everhard, in Cambridgeshire, in 1712. Having passed through the elementary parts of his education, he was entered at St. John's college, in the university of Cambridge, where he took his degrees in the arts, and obtained a fellowship in the college. He was afterwards appointed regius professor of divinity in the university, and created D.D. Being attached to, and well versed in, mathematics and natural philosophy, he was elected a fellow of the Royal Society, and was afterwards appointed a chaplain to his royal highness the prince of Wales. In the church he was rector of Barley in Hertfordshire, and of Shenfield in Essex, and an archdeacon. He died in October, 1771, having nearly completed his 59th year. He was author of

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a thin quarto in Latin, entitled "Ordo Institutionum Physicarum in privatis Lectionibus," of which the second edition was published at Cambridge in 1756; also of "A System of Natural Philosophy," in 2 vols. 4to., which for many years was held in high estimation; "Institutes of Natural and Political Law," being the substance of a course of lectures on Grotius, read in St. John's college in Cambridge, in 2 vols. 8vo. 1756; "A Letter to Dr. Middleton, in defence of Bishop Sherlock's Discourse on Prophecy," and divers other theological works. Dr. Rutherford communicated to a philosophical society at Spalding, a curious correction of Plutarch's description of the instrument used to renew the vestal fire, as relating to the triangle with which the instrument was formed.

RUTHERGLEN, or RUGLEN, in *Geography*, a royal borough and market-town in the lower ward of the county of Lanark, Scotland, is situated on the south bank of the river Clyde, at the distance of $2\frac{1}{2}$ miles S.E. from Glasgow, and 9 miles W. from Hamilton. It is a town of high antiquity, and was constituted a royal borough by king David I., whose charter was subsequently confirmed by his successors, king Robert Bruce, James V., and James VI. At that period the river Clyde was much deeper in the lower part of its course than at present, and Rutherglen was not only a considerable sea-port, but was in fact the first mercantile town in the valley of Clyde. When the city of Glasgow, now the emporium of Scottish commerce and manufactures, consisted but of a few private houses attached to the cathedral, this town was comparatively a busy spot, whose inhabitants devoted themselves to civil and commercial employments. Glasgow, indeed, appears even to have been within the bounds, over which the corporation of Rutherglen claimed jurisdiction; for a charter is yet extant, bearing date in 1226, whereby a grant is made to the bishop of Glasgow, and his successors, that no toll nor custom shall be levied in that city by the inhabitants of Rutherglen. All the mercantile importance of this place, however, is now lost, and it is also reduced in extent and population. It still retains, nevertheless, all the privileges of a royal burgh, and is governed by a provost, two baillies, a dean of guild, and fifteen counsellors, who are elected annually at Michaelmas. The principal branch of trade carried on here is the weaving of muslins for the Glasgow manufacturers. The market-day is Wednesday, weekly; and there are, besides, six annual fairs, famous for the sale of horses. Since the union, this burgh has joined with Glasgow, Renfrew, and Dumbarton, in sending a representative to the British senate.

The town of Rutherglen consists chiefly of one principal street, and a lane, called the Back-Row, both lying parallel in a direction nearly east and west. The main street, which is very straight and well paved, extends about half a mile in length, and is about 100 feet in breadth. From both sides of it, several lanes go off; and at the distance of about 150 yards to the southward is another lane, known by the name of Din's-Dykes, which is characterized with an indelible mark of opprobrium from the following circumstance. The unfortunate Mary, queen of Scots, having viewed the battle of Langside from an eminence near this town, no sooner saw her army defeated than she fled to the south. Din's-Dykes unfortunately lay in her way. Two rustics, who were at that instant cutting grass close by, seeing her majesty flying in haste, rudely attempted to stop her, and threatened to cut her to pieces with their scythes if she presumed to proceed a step further. Neither beauty, nor even royalty itself, can at all times secure the unfortunate, when they are assailed by the unfeeling or re-

vengeful. Relief, however, was luckily at hand, and her majesty was rescued from her barbarian oppressors.

The church of this town, which is the only public edifice worthy of notice, is very ancient, and is in a style of architecture superior to most churches in Scotland. But what renders it particularly interesting is the circumstance of its having been the scene of two transactions, in which the fate of sir William Wallace, and of the kingdom of Scotland, were deeply concerned. It was within the walls of this church that peace was concluded between England and Scotland in the year 1297, and it was here also that sir John Monteith contracted with the English to betray the greatest of Scottish heroes.

Rutherglen, in ancient times, was a place of strength, and had a castle attached to it, which was considered to be one of the most important Scottish fortresses. In the dispute between Bruce and Baliol for the possession of the throne, it fell, with many others, into the hands of the English. It was besieged by Robert Bruce in 1309; but he appears to have been compelled to abandon the enterprise by the approach of an English army. In 1313, however, it was taken by Edward Bruce, the king's brother; and seems ever after to have belonged to the Scotch. This castle was kept in good repair till a short time after the battle of Langside, when it was burnt by the orders of the regent, Murray, out of revenge against the Hamilton family, in whose custody it then was. One of the principal towers was, however, afterwards repaired, and having been enlarged by some modern improvements, became the seat of the Hamiltons of Elliston, lairds of Shawfield. At length, on the decline of that family, it was for about a century wholly neglected, and, by frequent dilapidations, was soon levelled with the ground. Its site is now converted into a kitchen-garden; but many of its sculptured stones may be seen built into the walls adjoining the town.

In Rutherglen the custom of riding the marches of the borough is still observed. On the day appropriated to this purpose, the magistrates and council assemble at the cross, whence they proceed, in martial order, with drums beating, &c. round the boundaries of the royalty, to see if any encroachment has been made. These boundaries are distinguished by march-stones set up at small distances from each other, which are shaped at the top in the form of a man's head; but the lower part is square. This peculiar form was originally designed to represent the god Terminus, of whom they are so many rude images. Every new burgess is bound to provide a march-stone at his own expence, and to cut upon it the initials of his name, and the year in which it is set up. It has been a custom, time out of memory, for the riders of the marches to deck their hats and drums with broom, and to combat with one another at the newly-erected stone, out of respect perhaps to the deity whose image they had set up, or that they might the more firmly impress on their minds the precise boundary of that place. This ceremony has of late been deferred till the company return to the cross, when the broom engagement commences with great fury, and lasts as long as the weapons will endure. Rutherglen is likewise famous for the singular custom of baking, what are called, four cakes, previous to St. Luke's fair. The operators are women only, and they seldom begin till after sunset, and a night or two before the fair. A large space of the house is marked out by a line drawn upon it. The area is considered as sacred, and if passed by any of the bye-standers, he or she incurs the penalty of a fine, which is expended in drink for the use of the company. This hallowed spot is occupied by six or eight women, all of whom, except the toaster, seat

feet themselves on the ground in a circular form, having their feet turned towards the fire. Each of them is provided with a baking-board about two feet square, which they hold on their knees. The person who toasts the cake, which is done on an iron-plate, suspended over the fire, is called the queen or bride, and the others her maidens. She nearest the fire on the east is named the toddler, and her companion on the left-hand the hodler. The remainder have arbitrary names given them by the bride. The business is commenced by the toddler, who takes a ball of the dough, forms it into a small cake, and then casts it on the baking-board of the hodler, who beats it out a little thinner, and then throws it on the board of her next neighbour, and thus it goes round from east to west till it comes to the toaster, by which time it is as thin and smooth as a sheet of paper. The first cake cast on the girdle is usually named as a gift to some well-known cuckold, from a superstitious notion that thereby the rest will escape that mischance. As the whole operation is performed by the hand, considerable noise is made; but as the bakers generally beat time to some air sung by one or more of the company, it is far from being disagreeable. Great dexterity is requisite in the performance of this custom, particularly in throwing the cakes from one board to another, without ruffling or breaking them; and as the toasting requires great skill, the most experienced person is always chosen for that part of the work. One cake is sent round in quick succession after another, so that none of the individuals engaged are suffered to be idle. The whole is a scene of activity, mirth, and diversion. There being no account, even by tradition, of the origin of this custom, it is presumed to be very ancient, and probably took its rise in the days of paganism, as it is fraught with several of the sacred rites peculiar to heathen worship; such as the leavened dough, the mixing with sugar and spices, the consecrated ground, &c.; but the particular deity for whose honour these cakes were first made, is a point of difficult solution. According to the population census of 1811, the borough and parish of Rutherglen contain 756 houses, and 3529 inhabitants. The History of Glasgow and its Suburbs, by James Denholm, 1 vol. 12mo. Glasgow, 1798. Beauties of Scotland, vol. iii. 8vo. Lond. 1806.

RUTHIN. See RUTHYN.

RUTHSBOROUGH, a village in queen Anne's county, Maryland, on Tuckahoe creek; 6 miles S.E. of Centerville.

RUTHWELL, a market-town and parish in the county of Dumfries, Scotland, is situated on the northern bank of the Solway frith. The town, which stands on the high road from Port-Patrick to Carlisle, was formerly a long straggling place, but has of late years been much improved, and almost entirely rebuilt, chiefly at the expence of the earl of Mansfield, who is proprietor of the greater part of the parish. It is a burgh of barony, and has the privileges of a weekly market, and several annual fairs. The parish extends about six miles along the shore of the Solway frith, and is nearly three miles in breadth. In virtue of an ancient charter from one of the kings of Scotland, all the inhabitants were entitled to manufacture salt duty free; consequently a large quantity of that article was formerly made here; and the trade is still followed by many persons, though the exemption from duty has been discontinued since the union. About forty years ago a singular road was discovered leading through a deep morass. It was formed of strong oak planks, eight feet in length, fastened down by stakes driven through the boards into the earth. At the time it

was thrown open, it lay six feet beneath the surface of the earth.

The church of Ruthwell, one of the oldest ecclesiastical buildings in Scotland, was formerly remarkable for an ancient obelisk which stood within its walls, and fragments of which are still visible in the church-yard. This monument was demolished by order of the General Assembly in 1644, under pretence of its being an object of superstition among the vulgar. When entire, according to Pennant, it measured about twenty feet high, exclusive of pedestal and capital, and was of a square form, but the sides were of unequal breadth. Two of these were ornamented with foliage and figures of animals, and had Runic inscriptions round the margin. On one of the broader sides was a very rude figure of our Saviour, and beneath were two other figures, one bearded, and the other not, designed to represent some of the apostles. The opposite side also displayed a figure of the Saviour, with Mary Magdalen washing his feet. These sculptures, says the author above-mentioned, were probably "the work of different times and nations; the first, that of Christian Saxons, the other of the Danes, who either found those sides plain, or, defacing the ancient carving, replaced it with some of their own." In the cemetery is a monument to the memory of Mr. Gawin Young, the Scottish vicar of Bray, who was ordained minister of this parish in 1617, and maintained his post for fifty-four years, notwithstanding the many changes from Presbyterianism to Episcopacy, and from Episcopacy to Presbyterianism, which occurred during that revolutionary period. The inscription has, among others, these words:

"Far from our own; amidst our own we ly;
Of our dear bairns thurty and one us by."

Within this parish stands Comlorgan castle, an ancient mansion, belonging to the earl of Mansfield. It is surrounded by extensive parks and plantations, and commands a fine view of the Solway frith, and of the adjacent country. There are likewise some remains of an ancient castle at Cockpool.

According to the population census of 1811, Ruthwell parish contained 231 houses, and 1184 inhabitants. Pennant's Tour in Scotland, vol. i. 4to. Lond. 1776. Carlisle's Topographical Dictionary of Scotland, 4to. 1813.

RUTICILLA, in *Ornithology*, a species of *Muscicapa*; which see.

RUTICILLA, the *Red-Start*; which see. See also *MOTACILLA Phenicurus*.

RUTIDEA, in *Botany*, a genus so named by Decandolle, from *ῥυτίς, ῥυτίδος, a wrinkle*, alluding to the ruggedness of its seeds. *Annales du Musée d'Hist. Nat.* v. 9. 219. *De Theis*.

RUTIGLIANO, in *Geography*, a town of Naples, in the province of Bari; 8 miles S.W. of Monopoli.

RUTILE, in *Mineralogy*, *Titane Rutile* of Brongniart, an oxyd of titanium: it is of a dark blue-red colour, inclining to brown, with a degree of metallic splendour: the longitudinal fracture is foliated; the cross fracture conchoidal and unequal. It is opaque or slightly translucent, and sometimes sufficiently hard to scratch quartz. The specific gravity is from 4.18 to 4.24. Rutile is infusible by the blowpipe, but with the addition of borax it melts into a yellow glass. It is found crystallized: the primitive form of the crystals is a right-angled prism. Sometimes two crystals are united by their extremities, forming a kind of twin-crystal. It also occurs in extremely minute capillary crystals,

crystals, which are either divergent or reticulated, but sometimes single, and are imbedded in quartz and rock-crystal. From the analysis of Klaproth, it appears to be a pure oxyd of titanium. This mineral is found near Limoges in France, in Hungary, at St. Gothard in Switzerland, on the Carpathian mountains, near Burgos in Spain, in Siberia, on the summit of Sierra de Avilla, in New Granada in South America, and in South Carolina in North America.

RUTILITE, called by Klaproth *Sphen*. Its colour is a brown, inclining to red, yellow, grey, or black. It is found both crystallized and amorphous. The crystals are small, oblique, four-sided prisms, which are acutely bevelled at both extremities, but are sometimes terminated by tetrahedral pyramids. The longitudinal fracture is radiated or foliated, the cross fracture flatly conchoidal, passing into even. The lustre is glistering, or faintly glimmering; it is more or less translucent on the edges. Rutilite scratches glass, is very brittle, and nearly infusible by the blowpipe, without the addition of borax or an alkali. The specific gravity is from 3.1 to 3.5. According to Klaproth it consists of

Oxyd of titanium	-	-	35
Silex	-	-	35
Lime	-	-	33

It is found at Passau, in the district of the Inn, in a rock composed of felspar, hornblende, and quartz. It also occurs in several Norwegian mines.

RUTILIUS, NUMATIUS, in *Biography*, a Latin poet, probably a native of Toulouse, and advanced to high employments at the Roman court, was a military tribune, and about the year 414 A. D. was prefect of Rome. The empire at this time, as we have seen in the article ROME, was over-run by the Visigoths, under the furious Alaric and his successors; and Rutilius, for the purpose of succouring his distressed native country, took a journey from Rome to Gaul, of which he wrote a description in elegiac verse. It consisted of two books, of which the latter is lost. The work gives a favourable impression of the writer, who was a Pagan, though it has been greatly censured by Catholic authors, on account of the following remarks which it contains on the monks of the island of Capraria. "The whole island," says Rutilius, "is filled, or rather defiled, by men who fly from the light. They call themselves monks, or solitaries, because they choose to live without any witnesses of their actions. They fear the gifts of fortune, from the apprehension of losing them; and lest they should be miserable, they embrace a life of voluntary wretchedness. How absurd is their choice; how perverse their understanding, to dread the evils, without being able to support the blessings, of the human condition. Either this melancholy madness is the effect of disease, or else the consciousness of guilt urges these unhappy men to exercise on their bodies the tortures which are inflicted on fugitive slaves by the hand of justice." For these and some other remarks on the Jewish sabbath as a commemoration "Lafati Dei," Rutilius and his adherents are styled, by his commentator, Barthius, *rabiosi canes diaboli*; but Tillemont remarks, that the unbelieving poet praises where he means to censure. The verse of Rutilius is said to be more elegant than the common standard of the age; and though the subject does not admit of poetry, he displays much taste and ingenuity. The "Itinerarium" was discovered in 1494 at a monastery, and has been several times printed. The best editions are those of 1582, and 1687. It is inserted in Burmann's "Poetæ Minores," and in Mattaire's "Corpus Poetarum."

RUTILUS, ROACH, in *Ichthyology*, a species of *Cyprinus*; which see.

RUTILUS *Lator*, a name given by many authors to the fish called in English *rud*, or *fin-scale*, and *rubellus*. See *CYPRINUS Erythrophthalmus*.

RUTINIUM, in *Ancient Geography*, a town of the island of Albion, upon the route from the Portus Rutupæ, between Mediolanum and Urioconium in the Itinerary of Antonine. Camden, Gale, and Baxter agree in opinion, that Rutinium was situated at Rowton castle; but Mr. Horsley is positive, that it was really at Wem, on the banks of the river Roden.

RUTKIN, in *Geography*, a town of Bohemia, in the circle of Königgratz; 8 miles E. of Gitschin.

RUTLAM, a town of Hindoostan, in the Malwa country; 48 miles W. of Ougein. N. lat. 23° 23'. E. long. 74° 58'.

RUTLAND, *First Duke of*, in *Biography*. The words of the opera of Tamerlane, written by Nicola Haym, and set by Handel in 1724 for the Royal Academy of Music, were dedicated to the duke of Rutland, not only as one of the directors of the Royal Academy of Music, and a liberal patron of science, but as a nobleman who, by study and application, had rendered himself a most intelligent judge both of the theory and practice of the art of music. And it is well known that the first duke of Rutland was an excellent performer on the violin; that his grace brought Carbonelli hither from Italy, when he returned from his tour through that country; and that the solos which this musician dedicated to him, were composed expressly for his use.

RUTLAND, in *Geography*, one of the Andaman islands, in the East Indian sea. N. lat. 11° 24'. E. long. 92° 27'.

RUTLAND, a county of Vermont, bounded N. by Addison county, E. by Windsor, S. by Bennington, and W. by New York. This county is watered by Otter creek and other streams. It abounds with lakes or ponds stored with fish; the principal are lakes Bombazan and St. Austin, the former in Hubbardton and Castleton, and the latter in Wells. It contains 25 townships, and 29,486 inhabitants. In this county are 14 forges, 3 furnaces, and a sitting-mill.—Also, a post-town of Vermont, the capital of the above county, situated on Otter creek; 55 miles from its mouth in lake Champlain, 45 miles W. by N. from Windsor. It contains a congregational church, a court-house, and 2379 inhabitants. The mean heat of this place is 43°.6, the least 21°, and the greatest 92°. Durable crucibles are wrought of the pipe-clay found here. N. lat. 43° 34' 30". W. long. 72° 50' 10".—Also, a township of Worcester county, Massachusetts; 14 miles N.W. of Worcester; incorporated in 1723, and containing 1231 inhabitants. It is situated on the height of land between Connecticut river and Merrimack. The prospects from the centre of the town are extensive and delightful. It is a curious circumstance, that the water which drops from the eastern roof of a barn in this town runs to the Merrimack, and that which falls from the western side runs to the Connecticut. In this town are two considerable ponds, which furnish streams in different directions, some of which are large enough for mills.

RUTLAND, a post-town of Ireland, in the county of Donegal, built in one of the cluster of islands called North Isles of Arran, in the district of the Rosses. The late colonel Burton Conyngham procured a grant from parliament to establish a settlement here, as a situation peculiarly adapted to the herring fishery. This town, so called from the duke of Rutland, who was viceroy at the time, has very fine stores and accommodations for drying and salting the fish, but,

but, like most undertakings which owe their origin to parliamentary grants, it has proved unsuccessful, and remains a monument of the folly of expecting to force trade by such means. The sum expended was 20,000*l.* by parliament, and as much more raised by mortgage on the estate of colonel Conyngham; a man who, however he might be mistaken in his calculations of advantage, was too honourable and patriotic to be suspected of an intention to mislead. Rutland is 153 miles N.W. from Dublin. N. lat. 54° 56'. W. long. 8° 18'. Journals of the House of Commons.

RUTLANDSHIRE, one of the central counties of England, is bounded on the north, north-west, west, and south-west, by Leicestershire; on the south and south-east by Northamptonshire; and on the east and north-east by the county of Lincoln. It is the smallest shire in the kingdom, extending only about 18 miles in length and 15 in breadth; its circumference being 60 miles, which gives an area of 200 square miles, or 128,000 acres. According to the parliamentary returns of 1811, it contains 3417 houses and 16,380 inhabitants.

The history of this county, in remote times, is so intimately connected with that of the surrounding counties, that they can scarcely be separated. Previous to the arrival of the Romans it formed part of the territories of the Coritani; and after the latter were forced to submit to the imperial authority, it was included in the province of Flavia-Cæsariensis. During the Saxon heptarchy it formed part of the kingdom of Mercia, under eighteen successive monarchs; and when the Saxon kingdoms became united into one, it seems to have belonged to the crown; as we find that Edward the Confessor bequeathed it to his queen Edith, and after her demise to Westminster Abbey. His will, which is still extant, says, "I will, that after the decease of queen Eadgith my consort, Rotelond, with all its appurtenances, be given to my monastery of St. Peter, and be surrendered, without delay, to the abbot and monks there serving God, for ever." So anxious, indeed, was the king to secure this obituary grant to the abbey, that he endeavoured to render more certain the observance of his will by a kind of anterior deed of gift, bearing date in the 25th year of his reign. This grant, however, was but of short duration, for when William the Conqueror ascended the throne, he resumed possession of Rutlandshire as crown land, and merely allowing the monastery to receive the tithes, divided it among some of his nearest relatives, and his most powerful adherents. These first Norman grantees were Robert Malet, great chamberlain of England; Gilbert de Gaunt; earl Hugh; Aubrey, the clerk, and several others. Some manors were likewise granted to the conqueror's niece Judith, afterwards countess of Huntingdon; and to Maud, countess of Albemarle, his half sister. Considerable possessions, however, were reserved to the crown; and in the reign of Edward II. it possessed the hundreds of Martinsley, Alito, and East hundred, all of which that monarch granted to the lady Margaret, wife of Piers de Gaveston, duke of Cornwall, to be held by her during the royal pleasure. The hundred of Wraugdyke was then the property of Guy de Beauchamp, earl of Warwick, but his son Thomas being a minor at his father's death, Edward gave that estate to Hugh Spencer the elder, on the pretence of its being in satisfaction of a debt due to him of 6770*l.* During those transactions, the present hundred of Oakham-Soke is never mentioned: it is therefore conjectured to have formed part of Martinsley hundred.

The aspect of the country in Rutlandshire is, generally speaking, very beautiful, being much diversified by gently

rising hills, running east and west, with vallies about half a mile in breadth intervening, so that every three or four miles presents a new view to the eye of the traveller. The principal vale is that of Catmose, in the centre of the county, which Camden describes as "a pleasant and fertile valley, perhaps from Coet Maes, which signifies in British, a woody plain." On the north side of this vale the ground rises, and level with its summit a flat tract extends for several miles to the northward, forming a kind of table land, looking down upon the fertile and well-wooded plains of Leicestershire, Nottingham, and Lincoln-shires. The southern district consists, in a great measure, of one widely expanded vale, mostly open land, which stretches into Northamptonshire; and on the western borders, the remains of the old forest of Liefeld are well wooded, and sink in the distance into the Leicestershire plains.

The climate of this county is generally reckoned good and healthy, but has no peculiarity demanding notice. The soil is various, but is, upon the whole, fertile. The most prevalent kind is a strong reddish loam, intermixed with keal, lying upon an under-stratum of blue clay; but almost every farm has a mixture of poor clay, hazel earth, white stony land, black clay and gravelly clay. This great variation of soils within a small space causes each sort to be much more valuable than it would be, were one kind prevalent throughout an entire lordship.

The modes of agriculture adopted here differ, as may be supposed, in some degree on the different soils, and also on the inclosed and uninclosed lands. Upon the uninclosed arable lands, except upon some of the light soils, the old course of two crops and a fallow is yet practised. On the light soil, a turnip crop is substituted for the fallow, and barley is sown instead of wheat for the ensuing crop. The second crops on both soils are peas, or peas and beans. A few farmers in the eastern district sow barley and broad clover after fallow, mowing the clover for a second year's crop, and feeding it off with sheep when it is considered as proper for a course of wheat. The farmers have an idea that winter ploughing is hurtful to the land, and consequently they lay their manure on the fallows, where it remains till the spring.

The inclosed lands consist mostly of the light soils, or limestone bases; and of the heavy red loam. These are principally under the Norfolk husbandry of four years' rotation, and without feeding off, except in the turnip crops; but another mode is likewise practised, of taking two crops of spring corn after breaking up the clover, then turnips, next barley with rye-grass and clover, after which there are three or four years' sheep-feeding, when it is broken up again for spring corn. The first of these methods is beneficial for raising a large crop of wheat, and the second is equally advantageous for sheep stock, and hence each has its warm advocates among the farmers.

Tenures in this county are various; freehold, leasehold, and copyhold, but freehold is most general. A few farmers hold their lands by leases of seven or twenty-one years' duration; but by far the greater proportion of land is held at will from year to year. Rents, in 1806, averaged about 1*l.* 1*s.* per acre, but they are now much increased. Above three-fourths of the parishes are exonerated from tythes, either by modus, or being made free. Farms differ much in size, running from 15 to 640 acres, but the large farms are few in number.

Respecting the mineralogy of Rutlandshire there is nothing worthy of notice, except that there is at Ketton "a kind of stone very proper and famous for buildings;" and in several places lime-stone, consisting of a hard and soft

species, and containing a great number of marine substances. The existence of chalybeate springs in different parts of the county, however, seems to prove the presence of iron-stone, but that mineral has not yet been discovered, at least in any quantity.

The only rivers of note, connected with the county, are the Gwash and the Welland. The former, which is popularly called the Wash, intersects the county nearly in the centre, crossing it from east to west. It takes its rise in Leicestershire, and is considered to be an excellent fishing river. The Welland also has its source in Leicestershire, and forms the boundary for many miles between this county and Northamptonshire. The other Rutlandshire streams are the Chater, which crosses the county to the southward of the Gwash, and the Little Eye, or Lytee, which bounds it on the south-west. Rutlandshire does not boast of a single lake; but it has the more important advantage of a canal, denominated the Oakham canal. This branch of a more extended line begins in the vicinity of Melton Mowbray, in Leicestershire, enters Rutlandshire near Teigh, and passes by Market Overton, Barrow, Cotmore, and Burley, until it approaches Oakham on the north side in the level of the vale of Catmose.

The roads in this county are tolerably good, but are not generally formed on a good plan, being raised too high before the materials are laid upon them, and the stones being much too large. No manufactures of any import are carried on here, owing to the deficiency of water and the scarcity of fuel. Rutlandshire may, therefore, be considered as entirely an agricultural county; and it is worthy of remark, that notwithstanding the improvements in husbandry, population has not increased during the last thirty years; while in manufacturing counties it has almost doubled itself within the same period.

Politically speaking, Rutlandshire is divided into five hundreds, *viz.* Wrangdyke, Alsto, Oakham, East, and Martinley, which contain fifty-three parishes and two market towns, Oakham and Uppingham. There are no boroughs in the county, so that it is represented in parliament only by two knights of the shire. In judicial affairs it is in the Midland circuit, and in ecclesiastical jurisdiction is subject to the bishop of Peterborough. Rutland was an earldom at a very early period, and the honour was usually a branch of the royal family. It is now a dukedom in the family of Manners. This county is altogether devoid of objects of antiquarian curiosity. Beauties of England and Wales, vol. xvii. by Mr. Laird, 8vo. 1814. General View of the Agriculture of the County of Rutland, by Richard Parkinson, London, 8vo. 1808. A portion of a history of this county has been recently published by Thomas Blore, folio. This specimen is so well executed, that every lover of topographical history, as well as the inhabitants of the county in general, must regret that the whole work is not completed in the same style and manner.

RUTLEDGE, the shire-town of Grainger county, in the state of Tennessee, situated in Richland valley: it contains a few dwelling-houses, and is merely a handsome flourishing village.

RUTLINGEN. See REUTLINGEN.

RUTNAGHERI, a hill-fort of Hindoostan, in Mysore, taken in the year 1799 by the British; three miles W.S.W. of Oudeadurgam.

RUTSHA, a town of Imiretta; 38 miles N.E. of Co-tatis.

RUTTAGURRA, a town of Hindoostan, in Malwa; 30 miles E.N.E. of Bilwah.

RUTTANGUR, a town of Hindoostan, in Baglana; 25 miles N.W. of Junere.

RUTTEE, a weight used in the East Indies, one hundred of which make eighty-eight caracts. See CARACT.

RUTTENSTEIN, in *Geography*, a town of Austria; 9 miles N.N.W. of Grein.

RUTTUNGUNGE, a town of Bengal, 47 miles S.S.E. of Nattore. N. lat. $23^{\circ} 53'$. E. long. $89^{\circ} 43'$.—Also, a town of Bengal; 10 miles S. of Boglipour.

RUTTUNPOUR, a circar of Hindoostan, bounded on the N. by Surgooja and Jushpour, on the E. by Gangpour, on the S. by a country unknown to Europeans, and on the E. by Goondwanah. Its chief towns are Ruttunpour, Raypour, and Dumdah. It is traversed towards the south by the river Mahanada.—Also, the capital of the fore-mentioned circar, in the country of Orissa; 326 miles W. of Calcutta, lying in the road from Bahar to Nagpour. N. lat. $22^{\circ} 16'$. E. long. $82^{\circ} 36'$.—Also, a town of Hindoostan, in Bahar; 12 miles N.W. of Durbungah.

RUFUBA, in *Ancient Geography*, a river of Italy, in Liguria, according to Pliny, lib. iii. c. 5.

RUTULI, a people of Italy, in Latium, who inhabited the country near the sea-coast. Their origin is uncertain; but it seems, according to Virgil, that at the arrival of Æneas, Turnus was their king. This prince, in his attempt to oppose the establishment of the Trojans, was killed in the combat. The Rutuli, in process of time, were often confounded with the Latins. Their capital was called Ardea.

RUTULUS, in *Roman Antiquity*, the barrier of the cavea, or place where the wild beasts used in amphitheatrical sports were shut up. It was made of iron bars, which turned upon hinges, and all at once flew open with great swiftness.

RUTUNIUM, in *Ancient British Geography*. See RUTINIUM.

RUTUPIÆ PORTUS, in *Ancient Geography*. See RICHBOROUGH.

RUTY-PUNDOC, in *Natural History*, a name given by the people of the East Indies to a peculiar species of yellow orpiment, which they find on the tops of the mountains there; and, after several calcinations, give internally in coughs and colds. The ancient Greeks used this orpiment in the same manner. We have of late run into an opinion of its being a fatal poison; but Dr. Boerhaave, in his *Chemistry*, affirms, on his own trials, that it is innocent and harmless. These people, who have not the use of chemistry, give us a hint of the virtues of great numbers of our own fossils, which are common also to their country. The selenitæ, fibrose tails, spars, and many other fossils, which we wholly neglect, are in common use with them, and great cures are often performed by them.

RUTZDORF, in *Geography*, a town of Brandenburg, in the New Mark; eight miles N. of Custrin.

RUTZEN, a town of Silicia, in the principality of Wolau; 18 miles N. of Wolau. N. lat. $51^{\circ} 37'$. E. long. $16^{\circ} 32'$.

RUUN, RUNO, or *Runeholm*, an island of the Baltic, belonging, in an extensive sense, to the province of Oesfel, and lying in the middle of the gulf of Riga, at the distance of 95 versts from the town of that name, and rather more than 51 versts from Oesfel. It is distinguishable far off at sea by a forest of birch trees, which occupies one of its sides. It is entirely the property of the crown, and is inhabited by Swedish boors. Here is a church, to which belongs a preacher, whose congregation is small, but income very decent, consisting of the tythe of all the products of the island, together with a portion of land. In this island is
a light-

a light-house, for the supply of which the boors are obliged to buy the fuel on the continent, the crown allowing them towards it 40 dollars. There is no farm on the island except that of the pastorate. Among the inhabitants, it is said, there are some remains of the old Livonians, who speak the Runic language, also the Esthnic, the Lettish, the Swedish, and most commonly the German and Rufs, each with facility, from their frequent intercourse with others. In the labours of the chase, and the capture of the sea-dog, they are indefatigable, by which they gain an opulent subsistence. They live in great harmony, and only intermarry among their own society. Tooke's *Russia*, vol. ii.

RUVU, a town of Naples, in the province of Bari, the see of a bishop; 5 miles S. of Trani. N. lat. $41^{\circ} 12'$. E. long. $16^{\circ} 28'$.—Also, a town of Naples, in Basilicata; 18 miles S.W. of Venosa.

RUY, a town of France, in the department of the Isere; 20 miles E. of Vienne.

RUYSCH, FREDERIC, in *Biography*, a celebrated anatomist and physician, was born at the Hague, in the month of March 1638. His father was commilitary of the States-general, and descended from a family of considerable wealth and importance at Amsterdam, where they had occupied places of public trust for two centuries, until the Spanish war, which began in 1576, occasioned a great revolution in their fortunes. The celebrity of the name, however, is built upon the talents and personal merits of Frederic. He commenced his academical studies at Leyden, after being grounded in grammatical learning in his native city, and applied himself with great assiduity to the study of anatomy, botany, and chemistry, especially to the practical investigation of these sciences, having conceived an early bias to the profession of medicine. His zeal and curiosity were so much excited by the new objects which opened before him, that he allowed nothing to interfere with his labours, and at length the habit of experimental research rendered the most laborious inquiries a mere agreeable recreation. He repaired also to Franeker, for the farther pursuit of his studies; but received the degree of doctor at Leyden, in 1664. Even during his pupillage at Leyden, he was applied to by Sylvius and Van Horne, to assist them in combatting the vanity of Bilsius, who came thither to exhibit his boasted method of preserving dead bodies.

After his graduation, young Ruysch returned to the Hague, where he married, and settled so heartily to the practice of his profession, as even to neglect every pursuit which had not some relation to it. In the following year, 1665, he published his treatise on the lacteal and lymphatic vessels, which contained the result of his inquiries while engaged in the dispute with Bilsius. In this work he does not deny that the existence of valves in the lymphatic had been noticed before, but he claims the honour of having first demonstrated them, and taught the method of discovering them. This ingenious tract immediately procured him reputation; and he was invited, the year after, to the chair of anatomy at Amsterdam; an invitation which he gladly accepted, on account of the great opportunities which it was likely to afford for the prosecution of his favourite researches. Anatomy, in fact, both human and comparative, henceforth constituted the principal object of his life: he spared neither time, labour, nor expence, for the attainment of his purposes; he was almost continually employed in dissection, and not only examined with the most minute exactness every organ of the human body, but devised means by which to facilitate the detection and demonstration of the different parts, and to preserve and exhibit them thus demonstrated. If he were not the discoverer of the use of injections, for the display of

vascular and other structure, he contributed, together with the suggestions of De Graaf and Swammerdam, by his own ingenuity and industry, to introduce that important practice among anatomists. His collection of injected bodies is described, indeed, as marvellous; the finest tissue of capillary vessels being filled with the coloured fluids, so as to represent the freshness of youth, and to imitate sleep rather than death. In this way he had preserved fœtuses in regular gradation, as well as young and adult subjects, and innumerable animals of all sorts and countries. His museum, indeed, both in the extent, variety, and arrangement of its contents, became ultimately the most magnificent that any private individual had ever accumulated, and was the resort of visitors of every description; generals, ambassadors, princes, and even kings, were happy in the opportunity of examining it. The czar Peter, in his journey through Holland in 1698, frequently dined at the frugal table of Ruysch, in order to spend whole days in his cabinet; and in 1717, on his return to Holland, the czar purchased it of him for 30,000 florins, and sent it to Petersburg. The indefatigable anatomist immediately commenced the labour of supplying its place by a new collection.

When we consider the advantages which Ruysch possessed, his ingenuity in devising the means of minute investigation, and the *improbis labor* by which he manufactured two collections of anatomical preparations, and investigated such a multitude of subjects, it will be expected that he must have been the author of some discoveries. He claims, indeed, and probably made many; which, however, were not all unknown to other anatomists: for his fault was a neglect of reading, which rendered him often ignorant of the discoveries of others; and therefore he sometimes gave, as new, what other writers had described. Among other parts which he investigated minutely, were the pulmonary circulation, (in which he claims the discovery of the bronchial artery,) the structure of the ear, of the brain, of the lymphatic and glandular system.

Ruysch was appointed professor of physic in 1685, a post which he filled with honour and reputation until the year 1728, when he unhappily broke his thigh by a fall in his chamber. He was also nominated superintendent of the midwives at Amsterdam, in the exercise of which office he introduced some improvements in the practice of these good women; especially the abolition of the habit of speedily extracting the placenta, which he believed to be expelled by an orbicular muscle at the fundus. He was a member of the Royal Society of London, and of the Academy of Sciences of Paris, having succeeded sir Isaac Newton, in the latter body, in 1727. In the same year he had the misfortune to lose his son, Henry Ruysch, also doctor of physic, who, like himself, was an able practitioner, well skilled in anatomy and botany, and was supposed to have materially assisted him in his publications, inventions, and experiments. This loss was the more severely felt, on the occurrence of the accident just mentioned, as it deprived him of his best assistance in completing the second collection of rarities, which he was occupied in making. His youngest daughter, however, who was still unmarried, and had been initiated into all the mysteries of his anatomical experiments, was fully qualified for the task of assistance which she now undertook, and he proceeded with his new museum; retaining his general health until the commencement of the year 1731, when he was carried off by a fever, in the ninety-third year of his age.

Ruysch was the author of many publications, several of which were controversial; for his want of reading, and consequent differences with some of the learned of his profession, led him into frequent disputes. His first work, which ori-

ginated in his defence of Sylvius and Van Horne against Billius, was entitled "Dilucidatio valvularum in Vasis Lymphaticis et Lacteis, cum figuris æneis," Hague, 1665. His second was "Observationum Anatomico-Chirurgicarum Centuria. Accedit Catalogus rariorum in Musæo Ruyfchiano," Amst. 1691; containing some curious facts and engravings. His third publication was an answer to Bidloo, who had attacked several of his doctrines, and was entitled "Responsio ad Godefr. Bidloo Libellum, cui nomen Vindictiarum, &c." 1694. In addition to this, he published no less than fourteen controversial works, in answer to professor Gaubius, to C. Wedelius, and others, which were entitled "Epistolæ Anatomicæ Problematicæ, unâ cum Responsionibus," and were printed between the years 1696 and 1700 inclusive, and in many of which considerable acrimony appears on both sides.

In addition to these numerous tracts, Ruyfch also published a series of anatomical essays, to the number of twelve, under the title of "Theaurus Anatomicus primus, secundus, &c." between the years 1701 and 1728, containing the results of his minute investigations into the structure of the different organs and textures of the body, and, in the last, observations on the anatomy of vegetables. He published also "Theaurus Animalium," in 1710, with plates; three decades of "Adversaria Anatomico-Chirurgico-Medico," in 1717—20, and 23. And a tract "De Fabricâ Glandularum ad Boerhaavium," 1722, in answer to an attack from that celebrated professor. A collection of all his works was printed at Amsterdam in 1721, 4to. entitled "Opera omnia Anatomico-Medico-Chirurgica;" but this is necessarily less complete than the edition of 1737, in five volumes, 4to.

Henry Ruyfch, the son of the preceding, who died in 1727, published a "Theatrum universale omnium Animalium, &c. 240 Tabulis ornatum," 1718, in two vols. folio. He is said to have been the sole depositary of the secret of his father, by which those beautiful preparations were made, which retained the appearance of life; and Ruyfch was reproached for allowing the contrivance to perish with his family. But the modern improvements in the art of injection do not probably fall short of his expedients, in the demonstration of the vascular structure of the different organs of the body. See Eloy Dict. Hist. de la Med.; Eloge de Fenelon; Hutchinson, Biographia Medica.

RUYSCHIA, in *Botany*, received that appellation from Jacquin, in memory of professor Frederick Ruyfch, the celebrated anatomist; another plant, which had borne his name, being referred to *Dracocephalum*. He is noticed by Haller, Bibl. Bot. v. 2. 98, for having directed his anatomical skill to the maceration and dissection of leaves, as well as for his fondness for exotic plants. He appears as the editor, commentator, and translator into Latin, of Commelin's valuable *Hortus Amstelodamensis*.—Jacq. Amer. 75. Schreb. Gen. 144. 823. Willd. Sp. Pl. v. 1. 1116. Mart. Mill. Dict. v. 4. Swartz Ind. Occ. 501. t. 11. Juss. 428. Lamarck Illustr. t. 135. (Souroubea; Aubl. Guian. 244. t. 97. Juss. 428.)—Class and order, *Pentandria Monogynia*. Nat. Ord. uncertain. Juss.

Gen. Ch. *Cal.* Perianth inferior, double; the outermost longest, in three deep unequal segments, coloured; the inner of five roundish, concave, obtuse, converging, permanent leaflets. *Cor.* Petals five, ovate, flattish, obtuse, reflexed, thrice as long as the inner calyx. *Stam.* Filaments five, awl-shaped, flat, spreading, shorter than the petals; anthers oblong, incumbent. *Pist.* Germen superior, roundish-ovate; style none; stigma quadrangular, cruciform, flat, *Peric.* Berry of two cells, *Seeds* numerous.

Ess. Ch. Calyx double; the outer in three deep unequal

segments; inner of five leaves. Petals five, reflexed. Style none. Berry of two cells, with many seeds.

Obf. Aublet describes the stigma as of five angles or points, and the germen of five cells.

1. *R. clusifolia*. Purple Ruyfchia. Jacq. Amer. 75. t. 51. f. 2. Willd. n. 1. Swartz Ind. Occ. 502.—Leaves obovate, obtuse, without transverse veins. Two segments of the outer calyx shorter than the inner one.—Native of the vast boggy forests in the interior parts of Martinico, where Jacquin found it flowering in April. Nobody else seems to have gathered this species. The *stem* is rather shrubby, two feet high, growing parasitically upon trees. *Leaves* alternate, on short stalks, obovate, obtuse, entire, coriaceous, shining, smooth, four inches long, with a solitary mid-rib, and no lateral veins. *Clusters* terminal, quite simple, solitary, erect, many-flowered; cylindrical, nine inches long; the common stalk cylindrical, thick and smooth; partial ones scattered, simple, short, spreading. *Flowers* between the size of a laurullinus and hawthorn blossom, inodorous, with purple petals. *Filaments* also purple, usually five, often seven, sometimes six. Jacquin did not see the ripe *fruit*, but conjectured it to be a berry.

2. *R. Souroubea*. Red and yellow Ruyfchia. Swartz Ind. Occ. 504. Willd. n. 2. (Souroubea guianensis; Aubl. Guian. 244. t. 97.)—Leaves obovate, emarginate, with a small point, and many transverse veins. All the segments of the outer calyx longer than the inner one.—Gathered by Aublet, on the banks of the river *du Gallion*, in Guiana, flowering in October. The *stems* are shrubby, but brittle, long and trailing, supporting themselves on the neighbouring bushes, but drooping at the ends; their outer bark ash-coloured, easily peeling off. *Leaves* alternate, on short thick stalks, smooth, fleshy, four inches long, marked with numerous, transverse, not very evident, veins. *Clusters* terminal, solitary, long and drooping, of numerous *flowers*, much larger than those of the first species; their partial stalks an inch long. The *outer calyx*, as we choose to call it, rather than a *bractea*, consists of three divisions, each near an inch long, of a coral red, one of whose segments is a tube, closed at the end, the other two obovate, or spatulate, concave above. *Inner calyx* of five or six yellowish leaves, firm, folding over each other. *Corolla* of a golden yellow, described by Aublet as monopetalous; but Swartz, who examined this author's specimens, says otherwise. *Stamens* yellow. Ripe *fruit* not seen by Aublet. No other person appears to have gathered this plant. The habit of the genus, and in some measure the peculiar conformation of the *outer calyx*, resemble *MARCGRAVIA*; see that genus, and *ASCIMUM*.

RUYSCHIANA. See *TUNICA* and *EYE*.

RUYSDAEL, JACOB, in *Biography*, was born at Haerlem in 1636, and at first studied surgery as his profession, although he had given early proofs of a fine taste in the art of painting; to which, at length, his attention was entirely directed by Nicholas Berghern, with whom he lived in habits of intimacy. He is said by some writers to have improved his taste in Italy, but scarcely a particle of Italian taste is to be found in his works. Nature was the school in which he studied; her pure etherial tints, her peculiar forms, the freshness of the morning, the brilliancy of mid-day, and the spirit-stirring tone of twilight, were the foundation of the principles by which he was governed, and in the contemplation of which he laid the basis of that perfection of locality to which he successfully aspired.

His landscapes are generally scenery in the neighbourhood of his residence, or occasionally taken from the rocky borders

of the Rhine, varied with cascades, which he composed and treated in a manner till then unknown, and till now unrivalled, as mere matters of imitation.

The talents of Ruyfdael were not confined to landscape, he painted sea-pieces with equal success; and he has seldom been surpassed in the truth, the brilliancy, and variety, with which he pursued that branch of the art, particularly fresh breezes and gales of wind.

He frequently obtained assistance in his figures from the pencils of Ostade, Vander-Velde, and sometimes from Wouvermary, which adds considerably to the prices obtained for his works, and they are in general of a considerable magnitude. Indeed a fine specimen of this master may be regarded as current coin, such is the general estimation of his talent. He died in 1681, at the age of 45.

His elder brother, Solomon Ruyfdael, was also a landscape painter in the same style, but with indifferent success. He gained more credit as a decorative artist.

RUYSDAL, in *Geography*, a town of Holland; five miles E. of Naerden.

RUYSSELADE, a town of France, in the department of the Lys, and chief place of a canton, in the district of Bruges. The place contains 5281, and the canton 10,071 inhabitants, on a territory of 65 kilometres, in two communes.

RUYSER, MICHAEL-ADRIAN DE, in *Biography*, a celebrated Dutch admiral, born at Flushing in 1607, entered into the naval service of his country very early. From the situation of cabin-boy he rose through all the commands to the rank of captain, in which he distinguished himself both among his own countrymen and foreigners. Much of the early part of his life was spent in the service in the West Indies, to which he is said to have made eight voyages, and two to Brazil. In 1641 he was sent to the assistance of the Portuguese, who had thrown off the yoke of Spain, and on this occasion he was raised to the rank of rear-admiral. His conduct obtained for him the applause of the king of Portugal, and he afterwards rendered some important services on the Barbary coast, entering the road of Sallee in a single ship, although five Algerine corsairs disputed the passage. When war broke out, in 1652, between the English and Dutch, Van Tromp having been disgraced, De Ruyter was appointed to the command of a separate squadron, for the purpose of conveying home a rich fleet of merchantmen. He fell in with the English admiral Ayscough, with whom he had an engagement off Plymouth, in the month of August, which lasted two days, and terminated so far to the advantage of the Dutch, that he brought his convoy safe into port. In the following October De Ruyter and De Witte had an action with Blake and Ayscough on the Flemish coast, which was severely contested; but De Ruyter, being deserted by some of his captains, found it advisable to retreat to his own coast, the loss having been nearly equal on both sides. Van Tromp was now restored to the chief command, and De Ruyter had a squadron under him in the battle of December off Folkestone, in which Blake was obliged to take shelter in the Thames. De Ruyter likewise distinguished himself in the terrible battle of three days, fought in February 1653, between Tromp and Blake, near the mouth of the Channel. In the month of June, Tromp and De Ruyter engaged Monk and Dean off Nieuport; and after a battle of two days, in which the two Dutch admirals successively rescued each other from imminent danger, the Dutch confessed their inferiority by retiring behind their own sand-banks. The commanders thence sent a warm remonstrance to the States concerning the necessity of a reinforcement, and at length they were enabled to attack the English under Monk and

Lawson, near Scheveling. In the final battle between the two republics, Tromp was killed; and though De Ruyter made every effort to restore the day, returning to the combat after he had been obliged to shift his flag to a frigate, yet he was at length compelled to withdraw his shattered ships to the Meuse. The peace with England, which was concluded the following year, gave a respite to this terrible service, and De Ruyter was sent to cruise in the Mediterranean. He was to reinforce Opdam, who was laying siege to that town, and this service being effected, he returned to his station. The Dutch trade was at this time much molested by French privateers, but the vigorous conduct of De Ruyter put an end to this predatory warfare. A dispute with Portugal brought this Dutch admiral again into action, and he exhibited his vigilance, taking several Portuguese ships at the mouth of the Tagus, and made several prizes from the Brazil fleet, till a want of provisions obliged him to return to Holland. War having recommenced between the Swedes and Danes in 1658, De Ruyter was sent with a fleet to the assistance of the latter. He made a descent on the island of Funen, defeated the Swedes, and forced them to surrender at discretion in Nyborg, whither they had retired. He then wintered at Copenhagen, where the king of Denmark ennobled him for his good services. In 1662 he was sent with a strong squadron to curb the insolence of the Barbary states, who had exercised their piracy upon the Dutch shipping, and succeeded entirely to the satisfaction of his employers. At the commencement of the disputes between Charles II. and the United Provinces, De Ruyter had a command on the coast of Africa, where he recovered the forts which had been taken from the Dutch by the English, and made prizes of some merchant ships. After the defeat of the fleet of Opdam by the duke of York, in 1665, De Ruyter returned, and was raised to the rank of lieutenant-admiral-general of the Dutch navy. In the parties into which Holland was at this time divided, De Ruyter was considered as attached to the republican cause, while the younger Tromp, his rival, was a warm adherent to the house of Orange: they, however, went to sea together. The first service of De Ruyter was to convoy home a fleet of merchantmen; and in June 1666, the great fleets of the two maritime powers met in the Downs; the Dutch commanded by De Ruyter and Tromp, the English by prince Rupert (see his article) and Monk, now the duke of Albemarle. In the three days fight which ensued the Dutch had the advantage, though the valour of the English rendered the contest very severe. Both De Ruyter and Tromp were obliged several times to shift their flags from ship to ship, and the latter, having borne down to the centre of the English, was reduced to the utmost extremity, when he was nobly rescued by his rival and political foe. The action was renewed on the fourth day, and in the end the English, who had been the greatest sufferers, withdrew to their harbours.

In the following August the duke of Albemarle and prince Rupert fell in, near the coast of Essex, with De Ruyter and Tromp, and in the ensuing action, Tromp, eagerly pursuing a defeated division of the English fleet, left De Ruyter alone to contend with the main body of the enemy, who, after a long and most severe contest, was obliged to retreat, exclaiming, how wretched he was that not one bullet of so many thousands would free him from the disgrace. He gained, however, additional glory by the good order in which he drew off his shattered ships, and in no action were his skill and courage more distinguished.

The year 1667 was memorable for the disgrace which the reign of Charles II. incurred by the triumphant entrance of the Dutch into the Thames. Negotiations for peace had been

carrying

carrying on at Breda, which De Witte had protracted, while he hastened the naval preparations. The Dutch fleet appeared in the Thames under the command of De Ruyter, which threw the English into the utmost consternation. A chain was thrown across the Medway, and some new fortifications were added to Sheerness and Upnore castle: but these preparations were unequal to the urgency of the case. Sheerness was soon taken, though defended with the utmost valour by Sir Edward Sprague. Having the advantage of a spring tide and an easterly wind, the Dutch, with six men of war and five fire-ships, pressed on and broke through the chain, and burnt several English men of war in their course: among these was the Royal Oak, the commander of which, Captain Douglas, perished in the flames, though he might readily have escaped. "Never was it known," said he, "that a Douglas left his post without orders." The peace which soon after followed gave some repose to De Ruyter, till the alliance between Charles II. and Lewis XIV. for the ruin of the Dutch republic, again called him to the defence of his country. With a fleet of 91 sail, in June 1672, De Ruyter attacked the combined fleets of 130 sail, commanded by the duke of York, Lord Sandwich, and Count d'Estrees, in Solebay; and after an engagement, which he represented as the most obstinate that he ever witnessed, night parted the adversaries, each claiming the victory. Lord Sandwich and Count d'Estrees lost their lives, and the other losses were nearly equal, but De Ruyter kept the sea, and safely convoyed home a large fleet of merchantmen. The French kept aloof, and suffered very little.

De Ruyter was now doomed to suffer danger from a different cause. During the popular fury against the opposers of the house of Orange, which proved fatal to the De Wittes, De Ruyter, as one of the party, notwithstanding the great services which he had rendered his country, was attacked in the streets of Amsterdam with all sorts of weapons, but escaped without much injury. When William was raised to the stadtholdership, the services of this great admiral were too important to be slighted through party disputes, and in 1673 he was sent to sea with a strong fleet in quest of the combined English and French, who were on the Dutch coast, under the command of Prince Rupert. An indecisive engagement ensued on the 7th of June, in which De Ruyter disengaged Tromp from the French squadron which had surrounded him. The battle was partially renewed on the 14th, and in August, as we have seen in the article RUPERT, a more severe engagement took place, in which an English and two Dutch admirals were killed, and both parties claimed the victory. De Ruyter, however, received the thanks of the stadtholder for his good conduct on this occasion. Peace between England and the Dutch soon after followed, and never since have the two nations contested the empire of the ocean with such mighty force, and so determined a spirit. France, at this time, was rising fast to be a maritime power, and Holland, in alliance with Spain, had to contend with her for the superiority. De Ruyter, in 1674, made a fruitless expedition to the French Caribbean islands. In the beginning of 1676 he was sent with a fleet to Sicily, which had been encouraged by the French to revolt from the Spaniards. He fell in with the French fleet under the Duke de Vironne, and an action ensued, which lasted the whole day, with no decisive advantage to either side. De Ruyter repaired to Leghorn to refit, and then, forming a junction with the Spanish fleet, they proceeded towards Messina. The French came out to meet them, led on by the celebrated Duquesne, and a second battle took place on the 21st of April. The Spaniards kept at a cautious distance, but De Ruyter, like himself,

rushed to the centre, broke the French line, and was in the act of chasing, when a cannon-shot wounded him in the left heel and right leg. A fever supervened, which within a week put an end to his life in the port of Syracuse, at the age of 69, deeply regretted by his country and admired by all Europe. The King of Spain had, only a few days previously to this, conferred upon him the title of duke, with a pension. His remains were magnificently interred at Amsterdam at the public expence, and a superb monument was erected to his memory. Univer. Hist. Hume. Campbell's Lives of the Admirals, edit. 1813.

RUZA, in *Geography*, a town of Russia, in the government of Moscow; 48 miles W.N.W. of Moscow. N. lat. $55^{\circ} 46'$. E. long. $36^{\circ} 2'$.

RUZASUS, ZAFFOONE, in *Ancient Geography*, a port in the eastern part of Mauritania Cæsariensis, situated E. of Ruscurium.

RY, in *Geography*, a town of France, in the department of the Lower Seine; nine miles E. of Rouen.

RYACOTTA, a town of Hindoostan, in Mysore, strong, and well furnished with guns, ammunition, and provision for its defence, but taken by the British in July 1791; 75 miles S. of Seringapatam. N. lat. $12^{\circ} 26'$. E. long. $78^{\circ} 5'$.

RYADER. See RIADER.

RYAL. See RIAL.

RYAL, a name given to the noble, which, on account of the scarcity of gold in the time of Henry V. of England, was diminished in size, whilst it retained its former value, but was restored by Henry VI. to its original size, and caused to pass for 10s. under this appellation. (See *Rose-noble*.) This ryal of 10s., and also the angel of 6s. 8d., with their divisions of half and quarter, were the sole gold coins, till, in 1485, Henry VII. published the double ryal, or sovereign of 20s. accompanied by the double sovereign of 40s. James I. of England issued rose-ryals of 30s., and spur-ryals of 15s.; angels of 10s., and angelets of 5s.; till his ninth year, when gold was raised in the proportion of 1s. in 10s.

RYALCHERY, in *Geography*, a town of Hindoostan, in the Carnatic; 10 miles N.W. of Bomrauzepollam.

RYAN, Loch, an arm of the sea, which extends itself in a S.E. direction into Wigtonshire, Scotland, forming, with the bay of Glenluce, the peninsula denominated the Rinns of Galloway. It is about ten miles in length from its entrance to Stanraer, which is situated at its head, and varies in breadth from two to four miles. On its eastern side stands the little village of Cairn, contiguous to which is a very safe and commodious bay, with good anchoring ground, and depth of water sufficient for ships of any burthen. King William's fleet anchored here on their passage to Ireland. Opposite to this village a sand-bank runs a considerable way across the loch, but few accidents ever happen upon it, and it even contributes to the safety of the southern part of the bay, by breaking the force of the tides, which flow strongly in the direction in which it lies. This bank abounds with oysters of a most excellent quality. Besides Cairn bay, there are several other excellent anchoring bays in the loch, called Portmore bay, the Wig bay, the bay of Soleburn, and the bay of Dalmenock. In short, the anchoring is good and safe in almost every part of the loch. For some further remarks relative to this arm of the sea, see STANRAER. Sinclair's Statistical Account of Scotland, vol. i. 8vo. Edin. 1791. Carlisle's Topographical Dictionary of Scotland, 4to. 1813.

RYANIA, in *Botany*, was named by Vahl in just commemoration of John Ryan, M.D. F.R.S., a very active and

and intelligent correspondent, to whom he was indebted for many specimens of rare plants from the islands of Santa Cruz, Montserrat, &c.—Vahl. *Eclog. fasc. 1. 51.* Willd. *Sp. Pl. v. 2. 1164.* Mart. *Mill. Dict. v. 4.*—Class and order, *Polyandria Monogynia.* Nat. Ord. *Tiliaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, tapering, spreading, finely ribbed, coloured, permanent leaves. *Cor.* Petals none. Nectary between the germen and stamens, the height of the former, pitcher-shaped, very villous. *Stam.* Filaments numerous, about 60, in a double row, awl-shaped, a little shorter than the calyx, smooth, except a few hairs at the base; anthers erect, awl-shaped, one-third the length of the filaments, pointed, corrugated, naked, finally waved at the edge. *Pist.* Germen superior, ovate, very villous; style smooth, the length of the stamens; stigmas four, convex. *Peric.* Berry dry, corky, nearly globular, of one cell, with five longitudinal tuberculated receptacles, from its inner coat. *Seeds* numerous, ovate, nearly globular, brown, besprinkled with a few minute hairs, and each half enclosed in a membranous tunic, with three double wings.

Ess. Ch. Calyx inferior, of five coloured permanent leaves. Petals none. Nectary pitcher-shaped, between the stamens and pistil. Berry corky, of one cell, with many tunicated seeds.

1. *R. speciosa.* Vahl. *Eclog. t. 9.*—Found by Dr. Ryan, in the island of Trinidad. A tree, with ash-coloured round branches, finely downy towards the ends. *Leaves* alternate, stalked, elliptic-oblong, pointed, entire, smooth on both sides, except a mealiness on the mid-rib beneath. *Stipulas* awl-shaped, hoary, rather longer than the footstalk, deciduous. *Flowers* axillary, mostly solitary, on short simple stalks. *Leaves of the calyx* an inch and half long. *Berry* double the size of a walnut. *Seeds* rather bigger than those of Coriander. Vahl conceived this genus to be allied to *Lactia*, but distinct in the nectary, permanent calyx, four stigmas, awl-shaped (not round) anthers, and other particulars.

RYCKE, THEODORE DE, in *Biography*, a learned critic, born at Arnheim in 1640; was first an advocate at the Hague, and then professor of history at the university of Leyden. In 1681 he delivered an oration "De Gigantibus," which, with a dissertation "De Primis Italiæ Colonis et Æneæ adventu," he added to an edition of Stephanus Byzantinus and Scymnus Chius, Lugd. Bat. 1684. He also published a valuable edition of Tacitus, with notes and illustrations, in 1687, in two vols. 12mo. He died in 1690.

RYCQUIUS, JUSTUS, was born at Ghent in 1587, and educated at Douay. From this place he travelled into Italy, and was for some time librarian to count Lodovico Sahero. Returning to the Low Countries, he was made canon of Ghent, and resided some time at Louvain. In 1624 he was appointed by Urban VIII. to the chair of eloquence in the university of Bologna, where he died in 1627. He published a number of Latin poems, and other works, but is chiefly known by his treatise "De Capitolio Romano," 1617, containing a description of the works of art, ancient and modern, preserved in that relic of antiquity. This performance obtained for him the title of a Roman citizen. It was reprinted at Leyden by Gronovius in 1696, with notes and plates. Gen. Biog.

RYD, in *Geography*, a town of Sweden, in the province of Upland; 20 miles S. of Upfal.—Also, a town of Sweden, in the province of Smaland; 22 miles E.S.E. of Jonkiöping.

RYDAHOLM, a town of Sweden, in the province of Smaland; 22 miles W.N.W. of Wexio.

RYDAL HEAD, a mountain of England, in Westmoreland; two miles N. of Ambleside.

RYDAL WATER, a lake of England, in Westmoreland, which communicates with the Windermere lake.

RYDALL, a river of Wales, which runs into the sea at Aberystwith.

RYDDA, in *Ancient Geography*, a city which the Jews conquered from the Arabians, under Alexander Jannæus. Joseph. *Antiq. lib. xiv. cap. 2.*

RYDER, Sir DUDLEY, in *Biography*, was born in the year 1691, and having received a good elementary education, he was brought up to the profession of the law. It may be observed, that the family from which the subject of this article was descended, had been very long established in Yorkshire, and took their name from Ryther, in the hundred of Barkston, in that county, hence the name has been written differently at different periods, as Rythre, Ryther, or Ryder. It appears from Dugdale's Baronage, that William de Ryther was summoned to parliament among the barons of the realm, from the 21st of Edward I. till the 1st of Edward II., and that he was succeeded by John de Rythre, governor of Shipton castle. Sir Dudley Ryder was appointed solicitor-general to his majesty George II. in 1733; in 1736 he was advanced to the office of attorney-general, and in 1754 he was appointed to the high office of lord chief justice of the court of king's bench. In the year 1756 his majesty, as a reward for his long and very faithful services, determined to advance him to the dignity of the peerage, by the title of lord Ryder, baren of Harrowby in Leicestershire, and a warrant was accordingly signed by the king for that purpose, on the 24th of May; but sir Dudley died on the following day, before the patent could be completed. He left a son, Nathaniel, the first lord who was so created in 1776. He died in 1803, and was succeeded by his eldest son, Dudley, the present lord.

RYDER, or RUYDER, in *Commerce*, a gold coin in Holland. The new stand-pennings, or ryders, are fixed by the regulation of 1749 at 14 florins, and the half ditto at 7 florins. The assay and value, &c. are as follow:

	Assay.	Weight.	Contents in pure Gold.	Value in Sterling.
	car. gr.	oz. dut. gr.	grains.	l. s. d.
Double ryder	standard.	o 12 2 1	284.2	2 10 3½
Ryder -	ditto.	o 6 9	140.2	1 4 10
Half ryder -	ditto.	o 3 4½	70.1	o 12 5
Ducat -	B. 1 2¼	o 2 5¾	52.8	o 9 4

Impressions.—The ryder has on the front, an armed horseman, with a drawn sword; the legend expresses the province in which it has been coined, thus: MO. AUR. PRO. CONF. BELG. ZELAND, that is, *Moneta aurea provincia confederationis Belgicæ Zelandiæ* (gold coin of Zeland, a province of the Belgic confederacy), with the arms of the province at bottom: reverse, the arms of the United Provinces, with 14 Gl. (14 guilders or florins); legend, CONCORDIA RES PARVÆ CRESCUNT (small things increase by concord). The half ryder bears the same impressions, except that it is marked 7 Gl.

The ducat has a foot soldier with a drawn sword, and a bundle of arrows in his left hand; legend, RES PAR. CRES., that is, *Concordia res parvæ crescunt*, as above, and the letters, HOLL. or ZEL. &c. to distinguish the province: reverse,

reverse, a square, with ornaments and the following words in five lines, MO. ORD. PROVIN. FEDER. BELG. AD LEG IMP.; that is, *Moneta ordinaria provinciarum federatarum Belgarum ad legem Imperii*, (the common coin of the confederated Belgic provinces, according to the law of the empire).

RYDER, or *Rider*, to a bill. See PARLIAMENT.

RYDRAIRE, in *Geography*, a town of Hindooftan, in Baramaul; 28 miles N. of Namacul.

RYDROOG, a town and fortrefs of Hindooftan, in Myfore; 128 miles N. of Seringapatam. N. lat. 14° 40'. E. long. 76° 52'.

RYE, in *Botany*. See SECALE.

RYE, in *Agriculture*, a species of corn much cultivated in some of the northern districts. It is a sort of crop that approaches the nearest to that of wheat of any that is at present in cultivation. There are two varieties of this grain, the *winter* and *spring* rye, or what is often distinguished into the *black* and *white*, or Dantzic sort, but the former is the largest and the most plump and hardy, consequently the most frequently grown by the farmer, however the spring kind may often be employed with success and advantage. This kind of grain is so capable of sustaining the effects of the weather, that when sown in the autumn it is seldom injured by the most severe winters; it is likewise more early in the spring than wheat, and though not equally valuable, is more certain of producing a good crop in general than that grain is.

Soil.—This is a sort of crop which is capable of being grown on most kinds of land, but the light dry sandy soils that cannot be converted to the purpose of wheat or barley, are probably the only ones on which it can be cultivated to advantage, from being the most adapted to it, and from few of them being so light or poor as not to afford good crops. It can, of course, only be introduced with success on such lands as are incapable of producing other sorts of corn to advantage. And from fowls being less fond of it than most other sorts of grain, it may be the most proper to be cultivated on those portions of ground that are situated close around the farm-houses and yards.

It is a crop which is mostly grown after early fed turnips, clover, peas, and other similar products, as well as after naked fallows. In particular cases, when grown on the cold and heavy kinds of soil, the grain is found to be much later in becoming ripe than on such as are dry and light in their quality.

This is also a kind of crop which, as in that of wheat, requires the land to be brought into a tolerable state of mellowness, and to be perfectly cleared from weeds. In many districts where intended to stand for a crop, it is the custom to put it in upon some sort of fallow, but where it is only to be fed off by sheep, seldom more than one ploughing is given, the land being broken up and fallowed for turnips, immediately after the green rye has been sufficiently eaten down by sheep or other animals. And it is the practice in some places to apply manure immediately for this crop; but where the soil is in a suitable state of tillage, and has not previously been too much exhausted by the growth of grain crops, it may be more proper, especially where it is not to be fed off, to defer the application of the manure, in order that it may be employed for the turnip or other green crop that is to succeed, the use of manure being apt to bring up weeds, and render it difficult to be kept clean.

Seed and Sowing.—In respect to the time of sowing this sort of grain, it is, in general, pretty much the same as that for wheat where a crop is intended, but when cultivated for green food for animals, it may be advantageous to

sow it more early, as in August and September, but it may be sown in October, and during the winter months, until the beginning of March, in particular cases, as where the early sowings have failed, or there is an intention of having a succession of this feed for sheep. In which cases, according to Mr. Bannister, it is usually sown on one ploughing on a wheat or other stubble where the field is to come in course for turnips in the following year. And the above writer says that the general allowance of seed, where the crop is designed to remain for grain, is, in most situations, from about two bushels to two and a half; but when the intention is to feed it off, three, or even more, may be a better proportion, as the plants, in such cases, should stand considerably thicker upon the ground, in order that the largest possible quantity of green food may be provided for the animals. And as the vegetation of this sort of crop is rather slow, it may be proper to put it into the ground when it is in a tolerably dry condition, otherwise much of it may perish, especially in wet seasons, and where the land is rather heavy.

It is likewise stated in the Report of Yorkshire, that it was formerly a prevailing custom to blend several other sorts of feeds with that of rye, and the practice still continues in some districts, in respect to wheat and winter tares, but it is by no means either advisable or useful, in Mr. Donaldson's opinion, since, in the first case, the rye is in a state fit for reaping long before the wheat, consequently much loss must be sustained by the farmer, and in the latter it is mostly in a state to be cut as green food, some weeks before the tares, and becomes ripe at much too early a period for them.

And in cases where wheat is blended with rye, it is often termed *messin*, the proportion of the latter to that of the former being regulated by the nature of the soil, and the opinion of the grower, the general principle being that of giving the largest proportion of rye to the lightest kinds of ground.

After-culture.—In cases where this crop is grown for the purpose of the grain, it will be necessary to keep it as clean as possible in the early stages of its growth by horse and hand weedings, and hoeings according as it is sown, when they may appear requisite; but where the intention is merely that of affording a supply of green food, for the use of sheep or other animals in the more early spring months, no further culture will be wanted after the crop has been put into the ground. This sort of crop is known to be ready to cut by the straw of the stems becoming of a yellowish colour, the ears hanging down in a bending manner, and the grain feeling hard and in a plump and full condition.

On the poor sandy soils of Suffolk good crops of this sort are seldom produced, and on those of a better quality the produce is rarely more than from two to three quarters on the acre. But in the north riding of Yorkshire it is stated, by the author of the Agricultural Report of that district, to amount to from three to six quarters to the acre of land.

In cases where this sort of grain is free from weeds, and cut when the weather is fine, it may be secured in the stack as fast as the reaping proceeds, without its being endangered by it. And the straw of this sort of grain is found to be superior to that of wheat, for the purpose of thatch, as well as for the use of the collar-makers, who require much of it.

The practice of farmers is sometimes, where rye is intended to stand for a crop, to feed it with sheep in the early spring, as in the beginning of March; but this should never be done

except where the crop is very luxuriant, and at so early a period as that there may be no danger of destroying the new formed ear of the grain. This kind of crop is also cultivated in particular cases, as where the ground is sufficiently light and dry to be turned down as a manure: where this is the case, the crop should always be turned in while in its most green and succulent state, and when the weather is moderately dry, in order that it may be more quickly reduced by putrefaction into a manure. And, in the more southern districts, it is not unfrequently grown for the purposes of the tanners, who have recourse to it in the preparation of leather.

Application.—The most usual application of this crop is as a green food for sheep in the early spring, before the turnip crops are ready. When grown in this view it is necessary, the author of Practical Agriculture says, to have attention to different circumstances, in order to derive the utmost advantage from the crops. As this grain begins to shoot out, or spindle, as it is termed by farmers, much earlier than wheat, care should be taken that the feeding of it down is begun at a sufficiently early period before the ear is formed in the *hose*, as the latter end of February or beginning of March, otherwise the stem or blade becomes firm and sticky, and the succession of green feed after the first eating extremely small. Indeed this may be done earlier than the first of these periods, in cases where the season is mild and open, and persevered in till the end of April. In all cases it is, however, advisable to let the crop be so advanced in its growth as to cover the ground tolerably before the sheep are turned in. As this sort of green food is said to have much effect in promoting the flow of milk in such ewes as have lambs, probably from its succulency, and its stimulant properties being applied immediately after the severity of the winter season, when the bodies of animals are known to be more capable of being excited by the action of stimuli, and when there is scarcely any other sort of green feed that can lessen its operation by being taken along with it, the culture of it must be the most advantageous, it is supposed, where sheep husbandry is extensively combined with that of tillage, especially that department of it which relates to the feeding of lambs. As by this means, from the quantity of succulent nutritious food that is provided, the lambs are prevented from being stunted in their growth while young, which is a matter of the utmost importance in their future feeding. And that in thus feeding the crop off by sheep it will constantly be necessary to keep the fields properly divided by means of hurdles, as in this way the loss of food will be much less, and some parts will become fresh while the others are eating down, which are advantages not to be disregarded in cases of this kind.

But Mr. Bannister thinks, that, notwithstanding what has been urged in favour of a rye pasture, it is scarcely worth the while of any farmer to attempt the cultivation of this grain, who does not keep large numbers of ewes and lambs; for as the feed usually fetches a high price, every advantage attending the crop will be more than balanced by the superior charges in the cultivation, except in the instance above-mentioned, where no expence should be spared to maintain the lambs in a thriving way, and to prevent their growing hard and sticky, as the butchers term it; for if lambs once sink in flesh, it is beyond the art of man to restore them to their former thriving state again.

Rye is, in many parts of the country, used for bread, either alone, or mixed with wheat.

Rye is also a grain which is much used in the distilleries, where it can be procured in large quantity, and also by the ginger-bread bakers. In the Rural Economy of Yorkshire it is observed, that before the use of lime was prevalent,

much rye was grown on the lighter lands upon the margin of the vale, and in the moor-lands scarcely any other crops than rye and oats were attempted. Now rye is principally confined to the moorland dales; and even there the alteration of soils by lime has been such, that wheat is become the more prevalent crop. Nevertheless, on light sandy moorland soils, rye is generally more profitable than wheat; and the bread which is made from a mixture of the two grains is here esteemed more wholesome to persons in general, than that which is made from wheat alone.

It is cultivated in many districts as a good spring green feed for sheep, particularly ewes and lambs. This is greatly the case on the South Downs, in the county of Surrey. It is there sown in the late summer months, or the very beginning of those of the autumn, the more early the better. When other food is scarce in the spring and in the lambing season, the ewes and lambs are turned upon it, proper portions being hurdled off for the purpose.

Some suppose it prepares well for turnips, and that on many accounts it may be raised with much use and advantage on open exposed sandy soils, where wheat crops will not succeed, for being fed off, and insure far better crops of the above roots, than are commonly met with in such soils and situations. There would, in these cases, it is said, be the benefit of an increased quantity of food, and of course an increase in the number of live-stock, which would produce a greater abundance of manure, and, consequently, of grain crops ultimately. The trouble and expence of adopting such a method of practice would be but trifling, inasmuch as the ground would be broken up only in the autumn instead of the spring; in return for which sheep-feed would be procured, and, at the same time, the land be well dressed for the further crop, which should constantly have a full supply of manure when the feed is put into the land.

This crop, on the whole, deserves more attention than it has commonly met with, as it forms one of the links in the chain of green food, by which live-stock, on arable farms, can be fed and supported the whole year round.

In many parts of France there have been certain years in which this grain, from no apparent cause, has proved noxious, and sometimes even poisonous. M. Perrault travelling through Sologne, was informed that the rye of that province was sometimes so corrupted, that those who eat of the bread that had much of the corrupted grain in it, were seized with gangrenes in different parts of the body, which were not preceded by any fever, inflammation, or any considerable pain; and that the gangrened parts usually fell off after a time of themselves, without the assistance of surgical instruments. The grains of rye thus degenerated, are black on the outside, and tolerably white within; and when they are dry, they are harder and closer than the natural good grain; they have no ill taste, but sometimes they have a viscous metallic-like honey hanging to one end of them. They grow longer than the other grains in the same ear, and are found from one or two to seven or eight in the same ear. Some have supposed that these were not the proper feeds of the plant, but some other extraneous bodies that got in among them; but it is evident, from a close inspection, that they are really the genuine feeds, only altered by some accident; the coats, and the furrow, and even the germen for the young plant, being entirely the same as in the natural feeds.

The places where the rye is found to degenerate in this manner, are all a dry and sandy soil. In these places there is scarcely any soil in which more or less of these large feeds are not found among the others, but where there are but few of them, the ill effects are not perceived. The seasons when the degeneracy is greatest, and the effects the worst

of all, are, when there have been excessive rains in the spring, and there come on excessive heats in the succeeding summer.

The bread which is made of the rye that holds ever so much of this bad corn, is not distinguishable from other rye-bread by the taste, and seldom produces its ill effect, till some considerable time after it is taken. Beside the gangrenes already mentioned, it not unfrequently brings on other bad consequences, such as drying up the milk of women who give suck, and occasioning sometimes malignant fevers, accompanied with drowsiness, ravings, and other dangerous symptoms. The part usually seized by the gangrene is the legs, and this often in a very frightful manner. The arms are the next part most subject; but all the other parts of the body are subject to it.

The first symptom of this approaching gangrene is a stupefaction and deadness in the part; after this there comes on some pain, though not violent, and the skin becomes livid; sometimes the skin shews no mark of it, but the pain and swelling increase; and it is necessary to make an incision into the flesh, to find the gangrened part. In the more desperate cases, the only remedy is, the taking off the part; and if this is neglected, the flesh is all wasted, and the skin becomes black, and clings round the bones, and the gangrene appears again in the shoulders.

The poorer people are only subject to this disease; and, as they principally eat the rye-bread, and as those years when there is most of this bad grain among the ears of rye, produce most of these disorders, it has been judged certain that the rye is the occasion of it. It may deserve enquiry, however, whether that grain may not be innocent of the mischief, and its degeneracy and the distemper attributed to it may not both be the effect of the same bad constitution of the air. If it proves, on enquiry, that only those who eat of the rye are subject to the disease, it will seem a proof of its being really owing to it; and in this case the mischief may be prevented by the sifting the grain before it is ground, the degenerated grains being so long that they will all remain in the sieve that lets the others through. The experiment has been made on the spot, by giving the flour of the corrupted grains alone to animals, and it is said they have been killed by it. *Philos. Trans. N^o 130.*

RYE-Grass, the common name of a particular sort of grass. See *RAY-Grass*.

It has been observed, from the trials made at Wooburn, under the care of Mr. G. Sinclair, that sheep eat this grass, when it is in the early stage of its growth, in preference to most others; but after the feed approaches towards perfection, they leave it for almost any other kind. A field in the park at the above place was laid down in two equal parts, one part with rye-grass and white clover, and the other part with cock's-foot and red clover: from the spring till midsummer the sheep kept almost constantly on the rye-grass; but after that time they left it, and adhered with equal constancy to the cock's-foot during the remainder of the season.

RYE, or *West Rye*, in *Geography*, a borough, market-town, and cinque-port, under the title of "ancient port and town," in the hundred of Gestrow, rape of Hastings, and county of Suffex, England, is situated on the coast of the British Channel, at the distance of 76 miles E. by W. from Chichester, and 62 miles S.E. by E. from London. It is of very high antiquity, but its early history is little known. It seems clear, however, that it was one of the original cinque-ports, and is mentioned as a member of them generally, in a charter granted by king Henry III. In the

reign of Edward III. the whole town was environed with a strong wall, and guarded by towers, under the superintendance of William d'Ypres, earl of Kent. At that period Rye was so considerable a port, that it furnished no fewer than nine armed vessels to the royal fleet, when the king undertook the invasion of France; but it suffered materially in the next reign, having been plundered and burnt by the French, who took advantage of the then distracted state of the country, to attack such of the coast-towns as were least capable of resistance. It soon, however, recovered from this disaster, and became a port of considerable consequence; but the rise of others on the same coast has rendered it for the last century comparatively unimportant. The harbour, which lies to the south-east of the town, is at present in a neglected state, notwithstanding it admits vessels of a large size to come quite up to the town-quay, about a mile and a half from its entrance. At spring tides the sea rises so high, and spreads itself so much, that two-thirds of the town are surrounded by water. The mackerel and herrings caught here in their seasons are reckoned the finest of the kind brought to the London market.

Rye is a borough of itself by prescription, as well as by charters granted in confirmation of its privileges. The corporation consists of a mayor, bailiff, jurats, and freemen. The mayor and bailiff are chosen from among the jurats on the Monday after St. Bartholomew's day, by the votes of a majority of freemen. When a vacancy occurs among the jurats, the mayor nominates a freeman to supply it, but he must be approved of by the jurats before his appointment becomes valid. Rye sends two members to parliament, who are ostensibly elected by the mayor, jurats, and freemen inhabiting the borough, and paying scot and lot; but, in fact, they are returned through the influence of the treasury, which is paramount in all the cinque-ports. The principal articles of trade here are, hops, wool, timber, kettles, cannon, chimney-backs, and other iron goods, from the works at Bakeley and at Breed. There are two weekly markets, on Wednesday and Saturday; and two annual fairs, on Whitmonday and the 10th of August.

The town of Rye occupies a considerable eminence, and is, generally speaking, regular and well built. In the centre of the principal street stands the market-house, the higher story of which is appropriated as a town-hall, for the use of the corporation. The church is constructed of stone, and is one of the largest parochial edifices of the kind in England, but does not otherwise claim particular attention. Here is besides a chapel, which was lately appropriated to the French refugees, who settled in the town and its vicinity during the late war; also meeting-houses for Methodists, Quakers, and other Dissenters. Here are likewise two free-schools, one of which was erected and endowed by a Mr. Peacock in the year 1644; and the other by a Mr. Saunders, at a later period. The only monastic establishment in Rye was a priory of Augustine friars, which existed previous to the time of Edward III. and continued to flourish till the general dissolution of religious houses by king Henry VIII. The church formerly belonging to this monastery is still standing, having been converted into a store-house for mercantile goods. Some remains of the ancient walls of the town may yet be traced, but the ditches are entirely filled up.

According to the parliamentary returns of 1811, this town and out-liberty contain 476 houses, and 2681 inhabitants. Camden's *Britannia*, by Gough, Suffex, folio, 1789. *Beauties of England and Wales*. vol. xiv. 8vo.

RYE, a town of Denmark, in North Jutland, formerly important, but now much reduced. The church at Rye,

in popish times, was reckoned to be a very sacred place; 16 miles W. of Aarhuys.

RIE, a township of New Hampshire, in America, on the sea-coast of Rockingham county, opposite the isle of Shoals, and 8 miles S. of Portsmouth: incorporated in 1719, and containing 1020 inhabitants.—Also, a township of New York, in West Chester county, in Long Island sound; 36 miles N.E. of New York city.—Also, a township in Cumberland county, Pennsylvania, containing 1356 inhabitants.—Also, a township in Cumberland.

RYECHUNGA, a town of Bengal; 13 miles N.W. of Beyhar.

RYEGATE. See **REYGATE**.

RYEGATE, the south-eastermost township of Caledonia county, in the state of Vermont, separated from Bath in New Hampshire by Connecticut river; containing 812 inhabitants.

RYELAND SHEEP, a breed of fine-woolled sheep, originally met with in the greatest perfection in a district of Herefordshire, termed the Ryelands. See **SHEEP**.

RYER, **ANDREW DU SIEUR DE MALEZAIS**, in *Biography*, was born at Marcigni, in Burgundy. Little is known of his history, but he became gentleman in ordinary of the king's bed-chamber, and knight of the Holy Sepulchre. He resided a considerable time at Constantinople in the king's service, and was consul for the French nation in Egypt, from which opportunities he derived a knowledge of the Arabic, Turkish, and other Oriental languages. He died in France, about the middle of the 17th century. His chief works as a literary man are, "A Turkish Grammar;" "A French Translation of the Koran," and another of the "Gulistan" of Saadi. His version of the Koran is in no great estimation, as he is said to have mixed the reveries of Mohammedan commentators with the original text.

RYER, **PETER DU**, a dramatic and miscellaneous writer, was born of a good family at Paris, in 1605. He procured a place of secretary to the king in 1626, which his poverty obliged him to sell, and he afterwards served in the same capacity Cæsar, duke of Vendome. In order to support his family he employed his pen in prose and verse. He composed nineteen pieces for the theatre, which were successful at the time of their appearance. Two or three of his tragedies obtained the applause of maturer criticism. His "Alcyonée" so much delighted queen Christina, that she had it read to her three times in one day. His "Scævole" still keeps its place on the stage. Du Ryer was admitted into the French Academy in 1646. A short time before his death he obtained the office of historiographer royal, with a pension. He died in 1658.

RYES, in *Geography*, a town of France, in the department of the Calvados, and chief place of a canton, in the district of Bayeux. The place contains 650, and the canton 10,510 inhabitants, on a territory of 147½ kilometres, in 29 communes.

RYEWATER, a river of the county of Kildare, Ireland, which passing by Carton, falls into the Liffey, near Leixlip.

RYKOWICZA, a town of Lithuania, in the palatinate of Brzecz; 25 miles S.E. of Brzecz.

RYKSDALER, in *Commerce*. See **RINDOLLAR**.

RYKSORT, a Danish silver coin, reckoned at twenty-four shillings. See **RINDOLLAR**.

RYMABAD, in *Geography*, a town of Hindoostan, in Mysore; 15 miles E.S.E. of Chinna Ballaburam.

RYMAROW. See **ROMERSTADT**.

RYME. See **RHYME**.

RYMENAUT, in *Geography*, a town of France, in the

department of the Two Nethes, situated on the Dyle; five miles E. of Malines.

RYMER, **THOMAS**, in *Biography*, a critic and antiquary, was born in the north of England, and educated at the grammar-school of Northallerton. He was admitted a scholar at Cambridge, then became a member of Gray's Inn, and at length was appointed historiographer to king William, in place of Mr. Shadwell. He wrote "A View of the Tragedies of the last Age," and afterwards published a tragedy named "Edgar." For the office of a critic he was certainly not well qualified, for he wanted candour; nor is his judgment much to be relied on, as he could condemn Shakspeare with such rigid severity. His tragedy will shew, that his talents for poetry were by no means equal to those whose poems he has publicly censured. But though he has no title to the appellation of poet or critic, as an antiquarian and historian his memory will long be preserved. His "Fœdera," which is a collection of all the public transactions, treaties, &c. of the kings of England with foreign princes, is esteemed one of our most authentic and valuable records, and is oftener referred to by the best English historians than perhaps any other book in the language. It was published at London in the beginning of the last century, in 17 vols. folio. Three volumes more were added by Sanderfon after Rymer's death. The whole were reprinted at the Hague, in 10 vols. 1739. They were abridged by Rapin in French, and inserted in Le Clerc's Bibliothéque, a translation of which was made by Mr. Stephen Whatley, and printed in one vol. folio. &c. 4 vols. 8vo. 1731, under the title of *Acta Regia*. Mr. Rymer died the 14th of December 1713, and was buried in the parish church of St. Clement's Danes. Some specimens of his poetry are preserved in the first volume of Mr. Nichols's Select Collection of Miscellaneous Poems, 1780.

RYNABAD, in *Geography*, a town of Bengal; 35 miles S.E. of Moorley.

RYNCHOPS, *the Skimmer*, in *Ornithology*, a genus of birds of the order Anseres, of which the generic character is, that the bill is straight, the upper mandible is much shorter than the under, the latter truncated at the apex; the tail is forked and shorter than the wings, nostrils linear, and the back toe small.

Species.

NIGRA; Black Skimmer, or Cut-water. The specific character is blackish, beneath white; bill red at the base; the lower mandible grooved; the front and chin are white; wings with a transverse white band; the two middle tail-feathers are black, the next edged with white; the legs are red, and it is about twenty inches long. It is found in divers parts of Asia and America. This bird is ever on the wing, sweeping the surface of the water, dipping its bill, or at least its under mandible, to scoop up the smaller fishes, on which it feeds. In stormy weather it frequents the shores, and is contented with oysters, and other shell-fish. There is a variety of a tawny colour, with a black bill.

RYNNTO, in *Geography*, a small island in the gulf of Bothnia, near the coast of Finland. N. lat. 60° 37'. E. long. 21° 46'.

RYNOORT, a town of Holland, on the Rhine; seven miles E. of Leyden.

RYOTS, the modern name by which the renters of land are distinguished in Hindoostan. In every part of India, where the native Hindoo princes retain dominion, these Ryots hold their possession by a lease, which may be considered as perpetual, and at a rate fixed by ancient surveyors

and valuations. This arrangement has been so long established, and accords so well with the ideas of the natives, concerning the distinctions of cast, and the functions allotted to each, that it has been inviolably maintained, in all the provinces subject either to Mahometans or Europeans; and to both it serves as the basis on which their whole system of finance is founded. In a more remote period, before the original institutions of India were subverted by foreign invaders, the industry of the husbandman, on which every member of the community depended for subsistence, was as secure, as the tenure, by which he held his lands, was equitable. Even war did not interrupt his labours or endanger his property. It was not uncommon, we are informed, that while two hostile armies were fighting a battle in one field, the peasants were ploughing or reaping in the next field in perfect tranquillity. (Strabo, lib. xv.) Under a form of government, which paid such attention to all the different orders of which the society is composed, particularly the cultivators of the earth, it is not wonderful that the ancients should describe the Indians as a most happy race of men; and that the most intelligent modern observers should celebrate the equity, the humanity, and mildness of Indian policy. A Hindoo rajah resembles more a father presiding in a numerous family of his own children, than a sovereign ruling over inferiors subject to his dominion. He endeavours to secure their happiness with vigilant solicitude; they are attached to him with the most tender affection and inviolable fidelity. We can hardly conceive men to be placed in any state more favourable to their acquiring all the advantages derived from social union. It is only when the mind is perfectly at ease, and neither feels nor dreads oppression, that it employs its active powers in forming numerous arrangements of police, for securing its enjoyments and increasing them. Many arrangements of this nature the Greeks, though accustomed to their own institutions, the most perfect at that time in Europe, observed and admired among the Indians, and mention them as instances of high civilization and improvement. There were established among the Indians three distinct classes of officers, one of which had it in charge to inspect agriculture, and every kind of country work. They measured the portions of land allotted to each renter. They had the custody of the *tanks*, or public reservoirs of water, without a regular distribution of which, the fields in a torrid climate cannot be rendered fertile. They marked out the course of the highways, along which, at certain distances, they erected stones, to measure the road and direct travellers. To officers of a second class was committed the inspection of the police in cities; their functions of course were many and various; some of which only we shall specify. They appropriated houses for the reception of strangers; they protected them from injury, provided for their subsistence, and, when seized with any disease, they appointed physicians to attend them; and, on the event of their death, they not only buried them with decency, but took charge of their effects, and restored them to their relations. They kept exact registers of births and of deaths. They visited the public markets, and examined weights and measures. The third class of officers superintended the military department; but, as the objects to which their attention was directed are foreign from the subject of this article, it is unnecessary to enter into any detail with respect to them.

There is still the same attention to the construction and preservation of tanks, and the distribution of their waters. The direction of roads, and placing stones along them, is still an object of police. *Choultries*, or houses built for the accommodation of travellers, are frequent in every part

of the country, and are useful, as well as noble monuments of Indian munificence and humanity.

The precise mode, however, in which the Ryots of Hindoostan held their possessions, is a circumstance in its ancient political constitution, with respect to which gentlemen of superior discernment, who have resided long in the country, and filled some of the highest stations in government, have formed very different opinions. Some have imagined, that grants of land were made by the sovereign to villages or small communities, the inhabitants of which, under the direction of their own chiefs or heads-men, laboured it in common, and divided the produce of it among them in certain proportions. (Descript. de l'Inde, par M. Bernouilli, tom. ii. 223, &c.) Others maintain, that the property of land has been transferred from the crown to hereditary officers of great eminence and power, denominated *Zemindars*, who collect the rents from the Ryots, and parcel out the lands among them. Others contend, that the office of the *Zemindars* is temporary and ministerial, that they are merely collectors of revenue, removeable at pleasure, and the tenure by which the Ryots hold their possessions is derived immediately from the sovereign. This last opinion is supported, with great ability, by Mr. Grant, in an Inquiry into the Nature of Zemindary Tenures in the landed Property of Bengal, &c. This question still continues to be agitated in Bengal, and such plausible arguments have been produced in support of the different opinions, that although it be a point extremely interesting, as the future system of British finance in India appears likely to hinge, in an essential degree, upon it, persons well acquainted with the state of India, have not been able to form a final and satisfactory opinion upon this subject. (Captain Kirkpatrick's Introd. to the Institutes of Ghazan Khan. New Asiatic Miscell. N^o II. p. 130.) Though the sentiments of the Committee of Revenue, composed of persons eminent for their abilities, lean to a conclusion against the hereditary right of the *Zemindars* in the soil, yet the Supreme Council, in the year 1786, declined, for good reasons, to give any decisive judgment on a subject of such magnitude.

Mr. Rouse, in his ingenious and instructive Dissertation concerning the landed property of Bengal, adopts an opinion contrary to that of Mr. Grant, and maintains, with laudable candour and liberality of sentiment, that the *Zemindars* of Bengal possess their landed property by hereditary right. Dr. Robertson, in his "Historical Disquisition concerning India," suggests, that the possession of land was granted at first during pleasure, afterwards for life, and at length became perpetual and hereditary property. But even under this last form, when land is acquired either by purchase or inheritance, the manner in which the right of property is confirmed and rendered complete, in Europe by a charter, in India by a "Sunnud" from the sovereign, seems to point out what was its original state. According to each of the theories above-mentioned, the tenure and condition of the Ryots nearly resemble the description which our author has given of them. Their state, we learn from the accounts of intelligent observers, is as happy and independent as falls to the lot of any race of men employed in the cultivation of the earth. The ancient Greek and Roman writers, whose acquaintance with the interior parts of India was very imperfect, represent the fourth part of the annual produce of land as the general average of rent paid to the sovereign. Upon the authority of a popular author, who flourished in India prior to the Christian era, we may conclude, that a sixth part of the people's income was, in his time, the usual portion of the sovereign. (Sacontala, act v. p. 53.) It is now

known, that what the sovereign receives from land varies greatly in different parts of the country, and is regulated by the fertility or barrenness of the soil, the nature of the climate, the abundance or scarcity of water, and many other obvious circumstances. By the account given of it, Dr. Robertson imagines that, in some districts, it has been raised beyond its due proportion. One circumstance with respect to the administration of revenue in Bengal merits notice, as it redounds to the honour of the emperor Akber, the wisdom of whose government has often been conspicuous. A general and regular assessment of revenue in Bengal was formed in his reign. All the lands were then valued, and the rent of each inhabitant and of each village ascertained. A regular gradation of accounts was established. The rents of the different inhabitants who lived in one neighbourhood being collected together, formed the account of a village; the rents of several villages being next collected into one view, formed the accounts of a larger portion of land. The aggregate of these accounts exhibited the rent of a district, and the sum total of the rents of all the districts in Bengal, formed the account of the revenue of the whole province. From the reign of Akber to the government of Jaffer Ali Cawn, A.D. 1757, the annual amount of revenue, and the modes of levying it, continued with little variation. But in order to raise the sum which he had stipulated to pay the English on his elevation, he departed from the wise arrangements of Akber; many new modes of assessment were introduced, and exactions multiplied. Robertson's India.

RYOZ, in *Geography*, a town of France, in the department of the Upper Saône; 11 miles N. of Besançon.

RYPOUR, a town of Hindoostan, in the circle of Gohud; 10 miles S.S.E. of Gwalior.—Also, a town of Hindoostan, in Bahar; 24 miles S.S.E. of Bahar.

RYPTICS, in *Medicine*. See RHYPTICS.

RYR, in *Geography*, a town of Sweden, in West Gothland; seven miles N.E. of Uddevalla.

RYS, a lake of Denmark, in Norland.

RYSAGON, in the *Materia Medica*, a name by which some authors have called the *caffumunar root*.

RYSBY, in *Geography*, a town of Sweden, in the province of Samland; 10 miles N. of Calmar.

RYSEMSEH, a town of Norway; 48 miles E.N.E. of Romsdal.

RYSEN, or RYSSEN, a town of Holland, in the department of Overyssel, on the river Regge; 20 miles N.E. of Zutphen.

RYSSADIUM, in *Ancient Geography*, a town and port of Africa, in Mauritania Tingitana, on the coast of the Iberian ocean, between Sestiarum Extrema and the promontory Mesagonites, according to Ptolemy. It is named by Antonine Rufardus Colonia, and Rufardir by Pliny, who places it near the promontory "Solis."

RYSSADIUM, a promontory of Africa, in the Interior Libya, near the promontory Arsinarium, according to Ptolemy.

RYSSADIUS Mons, a mountain of Africa, in the Interior Libya, in which Ptolemy places the source of the river "Stachier."

RYSWICK, in *Geography*, a large village in Holland, situated between the Hague and Delft, where the prince of Orange had a palace; and remarkable for a treaty concluded here in 1697 between England, Germany, Holland, France, and Spain; 30 miles S.W. of Amsterdam, and two S.E. from the Hague.

RYVES, THOMAS, in *Biography*, born in the latter end of the 16th century, and educated at Winchester school, from whence he was sent to Oxford. He became celebrated as a civilian in Doctors' Commons, and in the court of Admiralty. At the accession of Charles I. he was made king's advocate, and was knighted. He died in 1651. He wrote several works, among which were "The Vicar's Plea;" "Historia Navalis Antiqua;" "Historia Navalis Media."

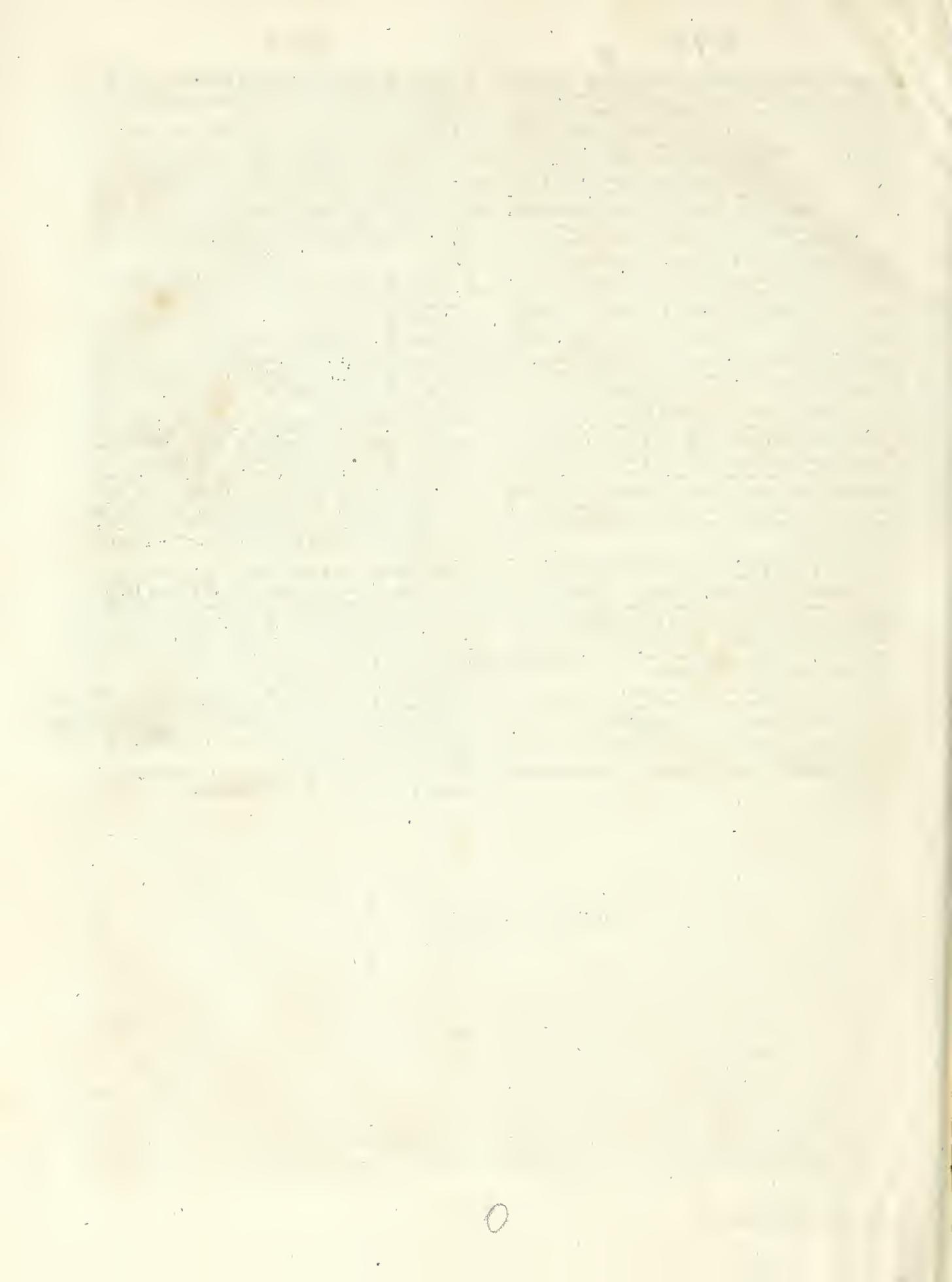
RYVES, BRUNO, an English divine, and near relation of the preceding. At the restoration of Charles II. he had the deanery of Windsor conferred on him. He was also secretary to Garter king at arms. He was author of "Mercurius Rusticus," or "The Country's Complaint," and divers other works, which were popular in their day.

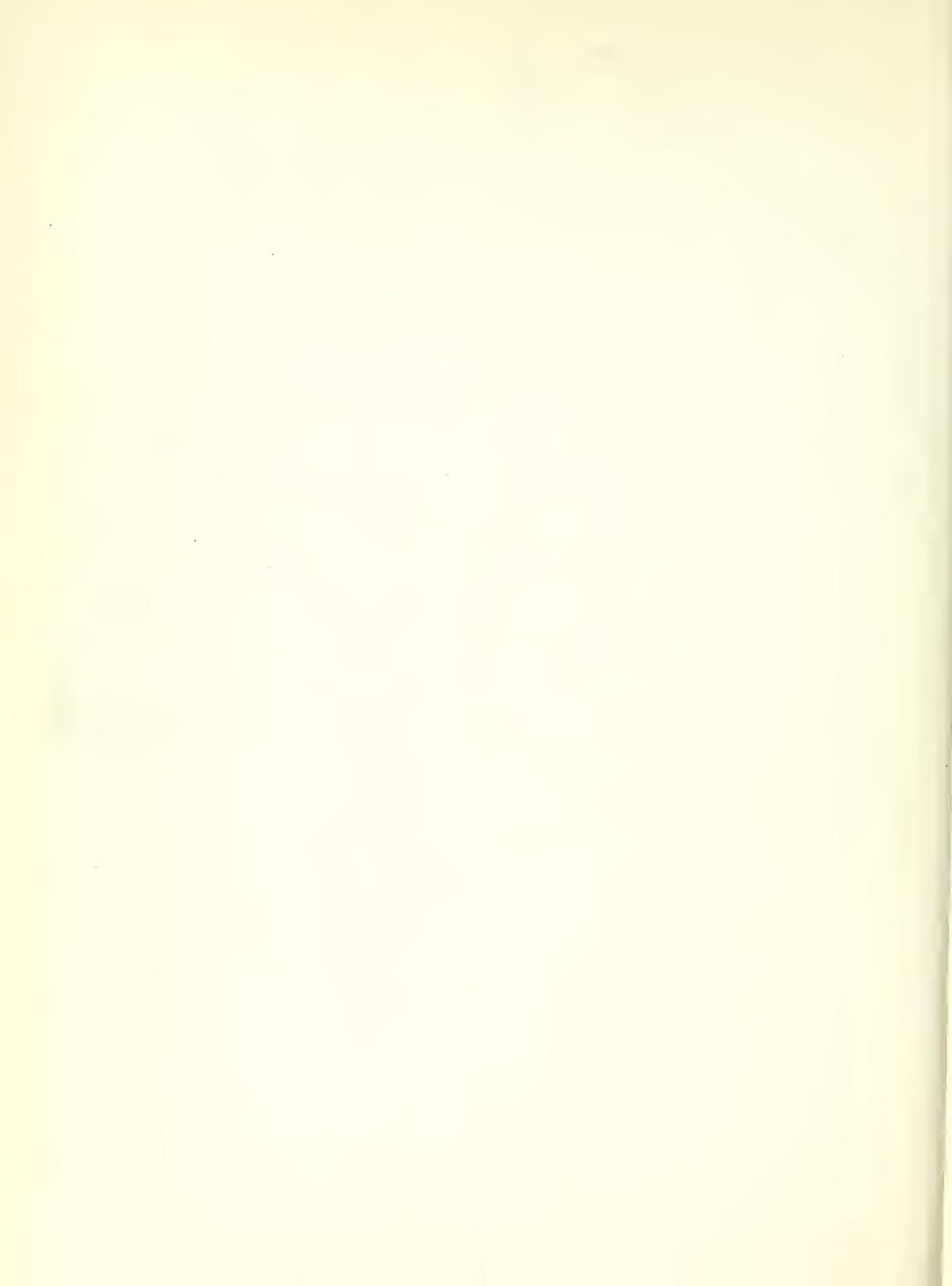
RYVORDEN, in *Geography*, a small island in the North sea, near the coast of Norway. N. lat. 59° 27'.

RZECZYCA, a town of Lithuania, in the palatinate of Minsk, on the Dnieper; 140 miles S.E. of Minsk. N. lat. 52° 10'. E. long. 31° 24'.

RZEMIEN, a town of Poland, in the palatinate of Sandomirz; 36 miles S.S.W. of Sandomirz.

END OF VOL. XXX.







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